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Essays on Corporate Governance and Banking

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Contents

1

Summary

This dissertation consists of three empirical essays related to corporate governance and banking.

The first essay, entitled *Independent or co-opted? Corporate directors with ties to the nonprofit sector*, studies the relation of independence and firm outcome, and focuses on independent directors that also belong to a nonprofit organization. Independent directors who also sit at boards of non-profit organizations (NPOs) may contribute valuable knowledge to their firms or possess personality traits that enhance their value as monitors. However, they may also be prone to be co-opted by the CEO with promises of donations to the NPO of their interest. This paper studies whether independent director's links with NPOs affect their performance by analyzing how the presence of NPO-linked directors affects firm value, CEO pay and earnings management. To identify the causal effect of NPO-linked directors I use the retirement of independent directors as a source of exogenous variation in the composition of the board and its committees. I find that the participation of NPO-linked directors at the compensation committee is significant in terms of firm value, level of pay and compensation structure. The sign of the effect will depend on managerial power, measured as CEO entrenchment. The results suggest that less entrenched CEOs use the appointment of NPO-linked directors to increase their influence over the board.

The second essay, co-authored with Pablo Ruiz-Verdú and is entitled *CEO Risk Taking Incentives and Bank Failure during the 2007-2010 Financial Crisis*. In this paper we show that stronger CEO risk taking incentives prior to the 2007–2010 financial crisis are associated with a higher probability of bank failure during the crisis. We define failure to include acquisitions facilitated by supervisors and employ measures of incentives that account for the risk taking incentives generated by CEOs' stock and stock option holdings. Risk taking incentives and bank risk were not the result of the use of particular compensation vehicles (such as stock options) or the governance failures usually considered in the corporate governance literature. On the contrary, CEOs' incentives were tightly aligned with those of shareholders.

Related to the risk-taking incentives of large financial institutions, the third essay (*Too big too discipline?*, also co-authored with Pablo Ruiz-Verdú) documents a possible bias in bank supervisors behavior that benefits systematically large firms in the industry. Through formal enforcement actions, bank supervisors can coerce banks into adopting policies or practices to limit their risk. Moreover, formal enforcement actions are public, so they can communicate important information to investors and depositors and, thus, constitute a source of market discipline. In this paper, we document that supervisors appear to have a bias when issuing formal enforcement actions: very large financial institutions are less likely to receive formal enforcement actions than one would expect on the basis of their fundamentals. At the same time, they do not seem to be less risky than smaller, yet large, financial firms. Very large financial institutions seem to be too big to publicly discipline.

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Introduction and Motivation

The corporate scandals and the financial crisis of the past decade have renewed the interest of the research related to corporate governance practices, especially in financial firms. These events motivated an increase in the independence requirements of board members and changes in the committee structure and the operation and responsibilities of the corporate board. These new requirements are based on the notion that further independence should improve governance and have a positive impact on firm value. However, the literature on the relation of board independence and firm performance is not conclusive and has failed to connect further improvements in board independence with firm performance. Two key concerns in the empirical analysis regarding the impact of board structure are the endogeneity of internal corporate governance and, on the other hand, the existence of alternative ways for the management of a company to co-opt directors meet the independence requirements but behave as managerial friendly (Hermalin and Weisbach, 1991),(Hermalin and Weisbach, 1998).

Besides the monitoring role of the board in a company, the design of managerial incentives as a mean to discipline management has also attracted a lot of attention. The recent financial crisis has brought to the spotlight the matter of managerial incentives in financial firms generating a still ongoing debate about limits and caps to compensation and bonuses. While executive compensation is a topic that has been widely studied in the past, research related to the impact of different compensation schemes on the risk taking behaviour of managers in financial institutions has received less attention compared to that of non financial firms. One of the reasons is the greater complexity of the analysis imposed by the larger opacity of financial institutions, different level of complexity in terms of organizational structure and the possible interaction between internal governance and regulatory requirements. In this line of research, the second paper of my thesis is a co-authored working paper with Pablo Ruiz-Verdú that studies how the risk taking incentives of bankers are related to bank failure during the 2007-2010 financial crisis. In the third paper of my dissertation we study the incidence of regulatory formal enforcement actions on financial institutions and their relation to their systemic importance.

Chapter 3 of this dissertation corresponds mostly to my job market paper. It is a study of the effect of board independence on firm performance and managerial power. In this chapter the focus is on the monitoring quality of corporate independent directors that also serve at the board of a non-profit organization (NPO-linked) and how CEOs could use their bargaining power to capture these directors. While their social involvement may be considered useful in their role as advisers, their interest in the fund raising activities of their NPO might turn them in easy targets to be co-opted through promises of corporate philanthropy (Bebchuk and Fried, 2006). By studying changes in the board caused by independent directors retirements, used as in Fracassi and Tate (2012), I find that NPO-linked directors are important in the definition of independence and that most of their influence comes from sitting at the compensation committee. The main specification compares the changes in the variables of interest in firms where an NPO-linked director retires (the treatment group) and in firms in which a non-linked independent director retires, but where both types of directors are appointed (the control group). This identification strategy controls for unobserved time-invariant heterogeneity and also takes advantage of that retirement decisions are likely to be in many instances uncorrelated to time-varying unobserved heterogeneity related to the outcome variable of interest. The main finding of the paper is that removing these directors from firms with low entrenchment index has power to explain successive increases of firm value and total pay, a reduction of earnings management and changes in compensation structure of the CEO reducing his portion of discretionary pay. This result indicate that CEOs with low entrenchment take advantage of this form of influence over independent directors to increase their power inside the firm. The main implication of these findings is that co-opting directors works as a substitute for managerial entrenchment.

In chapter 4 (co-authored with Pablo Ruiz-Verdú) we study how the risk taking incentives of bank CEOs are related to bank failure during the 2007-2010 financial crisis. Opposite to previous research on bankers pay (such as Fahlenbrach and Stulz (2011)) our main result is that, if we measure incentives taking into account the risk taking incentives embedded in the equity held by bank CEOs as proposed by Chesney et al. (2012) stronger risk taking incentives are associated with a higher probability of failure. Although we do not prove the existence of a causal effect of incentives on risk taking, we do not find support for several alternative explanations of our results. We also study whether risk taking incentives may be the result of corporate governance failures and find that, on the contrary, bank CEOs have stronger risk taking incentives in banks whose shareholders appear to also have stronger incentives to shift risk to other stakeholders. Finally, we show that risk taking incentives are not clearly associated with particular forms of compensation (such as stock options or termination payments), so that monitoring the use of different compensation vehicles may not be the optimal way to control the risk taking incentives of bank CEOs.

Finally, chapter 5 of this dissertation is also related to corporate governance and banking. We have manually collected data about the incidence of formal enforcement actions issued against banks both related to solvency and capital issues as well as governance requirements. An enforcement action is an action initiated by the federal supervisors against those financial firms that experience distress or lack of compliance. There are different types of formal actions with different levels of severity and scope, and in some cases they are related to downgrades in the CAMELS rating. The paper aims to study if banking supervisors take into account the systemic importance of the bank before issuing a formal enforcement action. Since formal enforcement actions have to be public, they can trigger a reaction from shareholders and investors, leading supervisors to consider avoiding issuing these types of actions. This behavior by regulators would correspond to a *too big to discipline* phenomenon, which like the *too big to fail*, would have consequences for banks risk taking incentives.

3

Independent or co-opted? Corporate directors with ties to the nonprofit sector

3.1 Introduction

Independent directors engage in other activities outside of the boardroom. Thus, many independent directors serve as directors at other corporate boards, are executives of other public or private companies, or actively participate in non profit organizations. In the last years there has been a debate about what is a true independent director and whether certain personal or professional individual characteristics are related with the effective monitoring of the board. In this paper I investigate whether directors' active involvement with non-profit organizations has an impact on their performance as monitors and advisers of the CEO.

The interest in the role of these directors is motivated by the competing views of their role as monitors. On the one hand, directors actively engaged with NPOs may better advise the CEO about the needs of stakeholders, such as employees, local communities or consumers; they may also help the firm better allocate corporate donations. Their active participation in NPOs may also endow the firm with a valuable network of connections. Moreover, directors active in the non-profit sector may have personality traits, such as integrity, which could make them better monitors of managers.

On the other hand, CEOs can influence the monitoring role of independent directors who are active in the nonprofit sector with the promise of corporate donations. Large U.S corporations engage regularly in different types of charity donations, either in cash, goods or services. In 2012 corporate giving made a total of $18.15 billion [1] with a median firm contribution of $60.95 million for the largest 100 companies in the Fortune 500. This amount represents a median contribution as a percentage of pre-tax profit of 0.96% [2].

Since CEO's have the power to influence the firm's charitable decisions, they could use this influence to reward friendly non-employee directors (Bebchuk and Fried, 2006; Shapira, 2012), thus compromising these directors' monitoring role.

The board of Enron is a case in point. Enron, Kenneth Lay (chairman) and Enron's Foundation donated $332,150 to the University of Texas' M.D. Anderson Cancer Center since 1999. In 1999 the Center's president John Mendelsohn became an Enron Director. Similarly, Wendy Lee Gramm was head of regulatory studies at the George Mason University's Mercatus Center and an Enron director by the time the company and the Lay Family Foundation donated to the

[1] GivingUSA report, 2012)http://www.philanthropy.iupui.edu/news/article/giving-usa-2013

[2] The Corporate Giving Standard. CGS Survey, 2013. http://cecp.co/pdfs/giving_in_numbers/GIN2013_Giving_Snapshot.pdf

center $50,000 and made political contributions for more than $80,000 to Gramm's husband, Senator Phil Gramm (R-Tex.). [3]

The first goal of this paper is to empirically investigate the impact of independent director involvement with NPOs on their monitoring role. In particular, I investigate the effect of the presence of NPO-linked directors on firm performance (measured by Tobin's Q) CEO pay level and composition, and earnings management activities (measured as discretionary accruals). CEO pay and earnings management have the advantage of being annual measures that reflect the bargaining process between the manager and the supervisory board.

The second goal of the paper is to shed light on the relation between board independence and board and firm performance. The regulatory changes in independence requirements from the last decade rely on the notion that more independence improves board monitoring. Better monitoring, in turn, is expected to ameliorate the agency problem between shareholders and the CEO, leading to better performance and curtailing excessive CEO pay.

As a response to corporate scandals in the early 2000's, the U.S Congress and the two major US stock exchanges revised the rules and definitions regarding corporate governance. The Sarbanes Oxley Act (SOX) was enacted July 30, 2002 with the goal of improving transparency and governance at the corporate level. Specifically, the SOX Act increased the standards about independence at the board requiring firms to form compensation, audit and nominating committees and imposing that the audit committee to be constituted solely of (at least three) independent directors. SOX was quickly followed by changes in the listing standards of NYSE and NASDAQ. Both exchanges define independent directors as individuals with "no material relationship" with the firm, and not involved in activities that may interfere with their "independent judgement" [4]. In general, they refer to individuals with no work relationship with the company, no family ties with a company employee, and no business contracts or financial transactions with the firm. These stricter requirements for independence were developed under the belief that the more independent the director the better their monitoring quality.

However, there are different positions about whether a change in the independence requirements of a board and changes in the board structure should necessarily be positive for the functioning of a firm, or have any effect at all. One needs to ask why a certain board structure is in place. While a certain board design could be there by accident, a more plausible hypothesis is that there is an optimal board for a certain company. Then, any regulatory change that forces to modify the current board structure should have a negative impact on overall firm performance because it would be forcing the firm to move away form the optimally chosen board (Adams et al., 2008).

The empirical literature about the effects of governance and board characteristics on firm performance or CEO compensation has mixed results. Core et al. (1999) find that variables proxying for the lack of independence of outside directors are positively correlated with executive compensation, which is consistent with the idea that when governance mechanisms are weak the CEO can extract more compensation from the firms. Similarly, Gompers et al. (2003) construct a governance index (G-index) as a proxy for shareholders rights and find that better governance is associated with higher firm value, profits and sales. Bebchuk et al. (2009) revised the relative importance of the twenty-four provisions used to construct the G-index and concluded that only six of them are associated with decreases in firm valuation and negative abnormal returns. These six provisions form what the authors call the entrenchment index (E-index). However, Bhagat

[3] Lavelle, L., 2002, January 21. Enron: how governance rules failed. Business Week, 28-29.

[4] Both NYSE and NASDAQ provide a definition of material transaction and independence. NYSE defines it in section "303A.02 Independence Tests" of the Listed company Manual at `http://nysemanual.nyse.com/`. NASDAQ uses definition IM-5605. Definition of Independence — Rule 5605(a)(2) at `http://NASDAQ.cchwallstreet.com/`.

and Bolton (2008) find that better governed firms according to GIM and E-indexes are not correlated to future firm performance although disciplinary management turnover is correlated with board independence. Moreover, Hermalin and Weisbach (1991), Bhagat and Black (2001) find no evidence of better performance of firms with more independent boards (measured as higher outsider/insider ratio).

According to (Adams et al., 2008), the reasons for this mixed results are two-fold. The first reason is related to the fact that, despite of the stricter requirements for independence mentioned above, companies still can find loopholes in the regulation in such a way that they formally meet the independence standards but at the same time assure that directors do not behave according to what an independent monitor is expected (this is usually referred as window dressing behavior from management). This issue about the true classification of outside directors imposes a challenge in the study of boards leading to wrong conclusions such as no connection between board independence and firm performance (Adams et al., 2008).

More specifically, in the case of independent directors who serve at nonprofit organizations the issue comes from the definition of related party transactions. Bebchuk and Fried (2006) argue that the independence and disclosure rules imposed by the NYSE do not solve the potential conflict arising from corporate donations because the $1 million cap on business to determine material transactions does not even apply to charitable contributions. They explain that a non-employee director of a corporation that also works (as a board member, CEO or trustee) of a nonprofit organization is still considered independent even if the firm of the corporate board at which he/she sits donates more than $1 million to that nonprofit. If such a transaction takes place, the only requirement is that the contribution should be disclosed in the statements of the firm. Even further, in the case a donation is made to a nonprofit organization (NPO) to which the director is not directly linked, but suggested by him to the board for a donation, not even disclosure is necessary. Similarly, Shapira (2012) also remarks that these transactions, that he calls *pro-social expenditures* can be used by CEOs to co-opt the inside governance mechanisms and undermine the independence of outside directors.

While corporate philanthropy itself does not necessarily imply anything wrong about the functioning of a firm, it has been debated if such behavior is or not reflecting an agency problem at the executive level. Fich et al. (2009) find that companies identified as regular givers (either directly or through a corporate foundation) have lower performance, higher CEO pay and weaker governance structure. In recent work, (Masulis and Reza, 2013) find evidence that supports the notion that corporate donations are a symptom of an agency problem between shareholders and the CEO whenever the management has influence on the size and allocation of the donations.

If CEOs can engage in window-dressing as a way to fulfill the regulatory requirements and still maintain a co-opted board, we should see little or no effect of increases of board independence requirements into firm performance. Cohen et al. (2012) provide an example of opportunistic behavior at the appointment of new directors. They study the appointment of analysts who have been optimistic about the firm performance in years previous to their appointments. They conclude that the appointment of these former analysts as independent directors has a negative impact on the firm value.

The second reason for the mixed results regarding the connection between board independence and firm performance has to do with the empirical identification strategy used in different papers. Hermalin and Weisbach (1998) stress that, besides the classification of co-opted directors as independent directors, the main challenge of empirical study of boards is the endogeneity of nearly all variables of interest. Boards of directors are endogenous institutions mke it difficult to disentangle if the chosen structure of a board is the cause of the governance problem, or if the choice of a certain board structure is a consequence of the poor governance reining in the firm.

For example, a poor performing firm may select a more independent board to improve its performance, but this may imply that, in the cross-section, poorly performing firms are correlated with larger independence ratios. In general, regressions of performance on governance variables suffer from endogeneity caused by unobserved heterogeneity (time-invariant unobserved characteristics of the firm or the managers that are correlated with the firm's outcomes), simultaneity bias and the dynamics of corporate governance structure through time (i.e. past performance affects both current performance and current board structure).

This study addresses these two issues, miss-classification of independent directors and endogeneity of boards. I use the network of directors that overlap their participation at corporate boards and at nonprofit organizations. This network of corporate directors and the nonprofit sector is matched with executive compensation to form a panel of firms between years 2003 and 2008. The links of directors to nonprofit organizations allows to evaluate whether formal or regulatory measures of independence capture well *true* independence or if additional information (such as connections of directors to the nonprofit sector) is necessary. To tackle the endogeneity concerns of the governance mechanisms, the empirical strategy consists of using independent directors retirements as a source of exogenous variation in the participation of NPO-linked directors at the board. The use of a difference in differences estimator combined with firm fixed effects provides consistent estimators of the effect of a change in the participation of directors with connection to the non-profit sector on the outcome variables of interest.

The main findings of this paper are that changes in the proportion of linked supervisory directors have a causal effect on firm performance, CEO pay and the absolute value of discretionary accruals, a measure of earnings management.

Another finding is that the influence of NPO-linked directors is more relevant inside the compensation committee compared with other committees in the board. This result is possibly related to the fact that participation of NPO-linked independent directors in certain committees is going to provide them a better or more direct position to bargain with the CEO. I also find that the effect of NPO-linked directors is heterogeneous across different levels of legal entrenchment of the firm (measured as the E-index). Reducing the participation of NPO-linked directors in the compensation committee has a positive and significant effect on firm market value and firm performance, affects CEO pay structure (with a reduction of salary), and increases earnings management in low entrenchment firms. These results are reversed in sign or nonexistent for firms with high entrenchment levels. This implies that the positive attributes of NPO-linked directors(such as social involvement, integrity, etc.) have a positive influence in governance for firms with high entrenchment level, while their weak features (such as their fund rising interest for their NPOs) are exploited in low entrenchment contexts where the CEO might be interested into increase his power or entrenchment.

This paper fits in the literature of independent boards, social ties of independent directors and busy directors. Cohen et al. (2012) show that firms hire as independent directors sell-side analysts who had previously covered the firm with a history of optimistic bias toward the company. The authors argue that this specific type of directors, while independent according to the listing standards, are management friendly. Such appointments result into a posterior poor firm performance and an increase of earnings management and CEO compensation.

Hwang and Kim (2009) use mutual alma mater, military service, regional origin, academic discipline, and industry as a proxy of social ties between a formal independent director and the CEO. They find that only 62% of the firms in the Fortune 100 have socially independent boards (while 87% of boards actually fulfil the legal definition of independence) and that boards both socially and legally independent award smaller compensation packages to CEOs and higher pay-performance and turnover-performance sensitivities. Similarly, Fracassi and Tate (2012) use a network of external connections between independent directors and CEOs. A connection exists if the CEO and the independent director serve together on the board of directors of another company, past work in the same company, play golf at the same clubs, professional organizations, etc. Their main finding is that firms with more powerful CEOs are more likely to appoint directors with ties to the CEO and that CEO-director ties reduce firm value.

3.2 Data

The starting point for the sample is ExecuComp's coverage, which consists mainly of S&P1500 institutions. The base sample of ExecuComp is merged with BoardEx, using both CIK numbers and CUSIPS, to obtain the board structure of each firm. The sample period used spans from year 2003 and 2008. The reason to start the sample in year 2003 is that BoardEx coverage, although available for previous years, is more complete and consistent from 2003 for US firms. Another advantage of this sample period is that it avoids including observations from years previous to the regulatory changes that might have affected the board composition. This matching process results into a total 1941 firms with 20279 identified directors. Accounting data and market data are retrieved from Compustat and CRSP. For each of the members sitting at a certain board-year I use BoardEx to obtain all the possible links of each board member with a nonprofit organization that overlaps in time with his appointment at the corporate board.

Then, a *NPO-linked* director is an individual who simultaneously serves at a corporate board as an independent director and also belongs actively to a nonprofit organization as a member, trustee, director or any other type of tie listed by BoardEx. Following to the requirement of the IRS to be tax-exempt under section 501(c)(3) of the Internal Revenue Code [5], I refer as non profit organizations (NPO) to those whose main activity is not generating profit to benefit any specific individual but serving to the general public. NPOs do not distribute profit to shareholders but reinvest their benefits to continue their operations. Examples of NPOs are institutions such as charitable organizations, universities, social clubs, sports associations, medical or health associations, professional associations, arts related organizations (as museums, ballets, orchestras) and educational institutions (community colleges, local schools, etc) [6]. In this paper NPO is going to be any organization classified by BoardEx as either a charity or a university. However this definition of organizational type by BoardEx excludes a large number of organization (such as museums, political associations, professional associations,etc) that are classified as "Private" but that are also registered as NPO organzations by the IRS. Several alternative definitions have been considered including other types of organizations containing references to charitable or non profit activities (i.e. museum, orchestra,school, academy, etc) to cover cases of misclassification by BoardEx, as well as information of NPO registered at the IRS. While these process has revealed a large number of potential *exclusions* from BoardEx, the main results of the paper remain unchanged if these exclusions are taken into account. The remainder of this paper reports results using the conservative alternative of only including those NPOs defined by the database.

Table 3.1 displays summary statistics for the entire sample (*Panel A*) and the subsample of firms with at least one NPO-linked director at the board in a certain year (*Panel B*) and firms without NPO-linked independent directors (*Panel C*). Last column of the table shows the difference in means for firms with and without linked independent directors.

[5] `http://www.irs.gov/Charities-&-Non-Profits/Charitable-Organizations/Exemption-Requirements-Section-501(c)(3)-Organizations`

[6] In the U.S. nonprofit organizations can file for tax-exempt status. The IRS provides a list of organization types that are eligible: Publication 557 "Tax-Exempt Status For Your Organization", pp. 65-66 `http://www.irs.gov/pub/irs-pdf/p557.pdf`

65.3% of the firm-year observations in the sample have at least one independent director with links to the nonprofit sector. The average fraction of independent NPO-linked directors is 16%, while in the subsample of firms with at least one NPO-linked director the average percentage of independent directors with NPO-links is 24%.

Compared to firms with no linked independent directors, firms with links are on average larger in size(measured as total assets at the end of the year), are more levered, have larger boards and a higher fraction of independent directors at the board. They are more entrenched in average and pay higher CEO total pay than firms with no NPO-linked directors.

In the remainder of the paper I will use the entrenchment index (E-index), constructed by Bebchuk et al. (2009), as a proxy for CEO power. The E-index consists of counting how many of six particular provisions the board has at a specific year. The six provisions are staggered boards, limits to shareholder amendments of the by-laws, supermajority requirements for mergers, supermajority requirements for charter amendments, poison pills and golden parachute arrangements. The first four out of those six provisions set obvious limits on shareholder voting power and reduce the ability of a majority of shareholders to remove management. The last two provisions are measures related to a hostile offer. Then, the E-index is a discrete variable that takes values from 0 to 6. The median E-index in the sample is equal to 2.58. In the following empirical analysis firms will be grouped as above or below the median level using 2 and 3 as alternative cutting points to better capture the true median distribution of firms across E-index.

3.3 NPO-linked Directors

3.3.1 Director Selection

There are basically four competing hypotheses regarding the selection and impact of NPO-linked directors at the board.

Initially, one could argue that the participation of an independent corporate director at a non profit organization as an alternative job or a hobby is irrelevant and that such type of individuals cannot be distinguished from any other independent director. In such case, the incidence of these directors in corporate boards is going to follow the population distribution of directors of certain age with certain personal characteristics that are more likely to engage in nonprofit activities. Moreover, we should not observe any difference in their participation across committees, their participation as independent directors shouldn't be significant in the cross section and an exogenous shock that changes the fraction of NPO-linked directors at the board would have no effect in the governance or performance of the firm.

An alternative hypothesis would be to consider NPO-linked directors appointments as part of the maximizing firm value strategy. NPO-linked independent directors could be valuable advisers for the board because of their social involvement, their knowledge of the community where the company operates or sells their products and even guiding corporate philanthropy to alliances that would improve the firm's image. Also, independent directors highly invested in non profit organizations can be valued by shareholders as better monitors with higher ethical standards. In this framework, NPO-linked directors would be part of an optimal board. In such case, while their participation should not have any effect in the cross section, an exogenous shock reducing their participation should translate into lower firm performance until they get replaced and their

Table 3.1: Summary Statistics LinkedD_pct is the fraction of independent directors with at least one simultaneous connection to a board of a NPO. Assets is total assets (in millions of U.S dollars), ROA is the log of net income plus interest expense divided by the lag of total assets. Q is the log of total assets plus market equity minus book equity, divided by total assets. Cash Flow is net income plus depreciation, scaled by beginning-of-year total assets. Market Leverage is long-term debt plus debt in current liabilities, divided by the numerator plus market equity. Entrenchment Index measures anti-shareholder charter provisions and is defined and constructed by Bebchuk et al. (2004). Total Pay is total CEO pay in the year (measured in thousands of U.S dollars) as TDC1 reported by ExecuComp. Independence is the number of independent directors appointed at the board divided by the board size. Board Size is the total number of directors at the board. Panel A contains information for the whole sample, panel B and C show summary statistics for firms that have at least one director with a NPO connection y firms with no directors related to a NPO board respectively. Last column reports the difference of means as Panel C - Panel B. *, ** and *** represent significance levels at 10%, 5% and 1% respectively.

	Panel A: All Sample				Panel B: Firms with linked directors				Panel C:Firms with no linked directors				
	Obs.	Mean	Median	Std. Dev.	Obs.	Mean	Median	Std. Dev.	Obs.	Mean	Median	Std. Dev.	Difference (NL-L)
Assets	9204	15052.12	1554.06	91916.09	5748	21984.66	2209.91	115379.60	3456	3521.97	896.35	12147.75	-18462.70***
ROA	8523	0.04	0.05	0.14	5435	0.05	0.05	0.12	3088	0.04	0.05	0.17	-0.01*
Q	9173	1.94	1.52	1.36	5736	1.92	1.51	1.28	3437	1.98	1.55	1.47	0.05*
Cash Flow	8192	0.09	0.09	0.15	5198	0.09	0.09	0.13	2994	0.08	0.10	0.18	0.01
Leverage	8560	0.21	0.15	0.22	5276	0.22	0.16	0.22	3284	0.19	0.12	0.21	-0.04***
CEO age	8884	55.09	55.00	7.41	5534	55.29	55.00	7.22	3350	54.76	55.00	7.70	-0.53***
CEO tenure	8896	7.17	5.00	7.23	5588	7.11	5.00	7.42	3308	7.28	5.00	6.90	0.17
E-index	7560	2.58	3.00	1.26	4961	2.61	3.00	1.26	2599	2.53	3.00	1.26	-0.08***
CEO total pay	9132	4870.08	2792.89	7142.28	5705	5475.41	3274.75	7257.98	3427	3862.36	2133.01	6828.41	-1613.05***
Board Size	8814	10.01	10.00	2.86	5752	10.63	10.00	2.90	3062	8.84	9.00	2.39	-1.79***
Independence	8814	0.75	0.77	0.13	5752	0.76	0.78	0.12	3062	0.72	0.75	0.14	-0.04***
LinkedD_pct	8804	0.16	0.14	0.15	5752	0.24	0.20	0.13	3052	0.00	0.00	0.00	-0.24***

replacement should take place as soon as possible with a similar director. The appointment of NPO-linked directors in this setting should not be related to CEO power and should also be connected to more transparency and better governance.

There are two intermediate alternatives to the previous extreme cases. On one hand it could be argued that the appointment of NPO-linked directors is a result of CEO consumption of private benefits. CEOs are interested in developing social ties to non profit organization members as a source of increasing their personal connections, taking advantage of the warm glow of charitable giving or having access to art and cultural elites. Under this hypothesis , the appointment of NPO-linked directors should be increasing on CEO power and their participation at specific committees would be either irrelevant or less frequent in the most active or relevant ones. It would also be consistent with this hypothesis to find a weakly worse performance of the firm in the cross section since NPO-linked directors would be sub-optimal appointments, in the sense that they are not hired for their skills and potential contribution to the advising and monitoring role of the board.

Finally, an alternative hypothesis is that CEOs searching to increase their power or entrenchment at the firm exploit the non profit connection of independent directors. Being a member of the board of trustees of a non profit organization implies to be highly involved in the fund rising activities of the organization. CEOs have enough discretionary power to influence the release of funds for charitable contributions and they could use those donations to influence independent directors. Under this hypothesis, NPO-linked directors are going to be relevant in firms where the legal entrenchment of the CEO is low and seeks to increase his power. Then co-opting NPO-linked directors would work as a substitute of the entrenchment power that the CEO does not have. Opposite, in firms where the CEO already possess a large managerial power NPO-linked directors would be either irrelevant or simply respond to the private benefits consumption of CEOs, as stated in the previous hypothesis. The strategic position and committee where the independent director operate is going to be significant as it provides him with bargaining power to negotiate with the CEO in areas where there is a clear conflict of interest between CEO and shareholders. NPO-linked directors at the compensation and nomination committees can directly exploit their influence on CEO pay and CEO turnover. An exogenous change in the participation of NPO-linked directors in a board where the CEO enjoys a relatively low level of entrenchment would result into an improvement in firm value and governance characteristics.

Table 3.2 displays the results for alternative specifications using different measures of appointments of new independent directors with links, controlling for firm size (measured as the natural logarithm of total assets), Tobin's Q, and ROA to capture firm characteristics that are determinants of firm strategy and overall governance and firm performance.

For robustness, specifications considered in table 3.2 uses alternative measures of the appointment of linked directors. Column (1) contains results for a linear probability model with LinkedD_pct (fraction of independent directors with links to an NPO) as main dependent variable. Column (2) also uses linear model and New_Link_App (measured as the total linked appointments in a certain year) as the dependent variable. Column (3) is similar to column (2) but restricted to those firms that have appointed at least one independent director that year. Column (4) uses dependent variable a dummy variable equal to 1 is the firm has appointed at least one independent director with links. Column (5) is identical to column (4) but restricted to the sub-sample of firms that appoint at least one independent director that year. Column (6) is identical to (5) but introduces a logit model with firm fixed effects. Finally, column (8) displays results for OLS with firm fixed effects where the dependent variable is the fraction of new appointments that have links to the non-profit sector.

Overall, the results in table 3.2 support the hypothesis that highly entrenched CEOs prefer to have less directors with NPO ties on the board. The coefficient of E-index is negative

Table 3.2: Director Selection In columns 1 the dependent variable is the fraction of independent directors with at least one connection to a non-profit organization. In columns 2 and 3 the dependent variable is the fraction of new appointments that hire a linked independent director. In columns 4 to 6 the dependent variable is a dummy equal 1 if that year a linked independent director has been appointed to join the board. Column 7 uses as dependent variable the ratio of new appointments of linked directors to total new appointments. *E-index* is the entrenchment index constructed as in Bebchuk et al. (2009). *ROA* is the natural logarithm of 1 plus the ratio of net income plus interest expense, scaled by the lag of total assets. *Q* is the natural logarithm of 1 plus book value of assets plus market value of equity, minus book value of equity divided by total assets. *Firm size* is the natural logarithm of total assets. *Board size* is the total number of directors appointed at aboard in a year. *Independence* is the ratio of independent directors scaled by board size. Robust standard errors in parentheses. *, ** and *** represent significance levels at 10%, 5% and 1% respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	LPM	LPM	LPM	Probit	Probit	Logit+FFE	OLS+FFE
	LinkedD_pct	New_Link_App	New_Link_App	D_app	D_app	D_app	App_ratio
Eindex	−0.0049***	−0.0071***	−0.0153*	−0.0657***	−0.0511	−0.3493***	−0.0345**
	(0.002)	(0.002)	(0.008)	(0.025)	(0.033)	(0.135)	(0.014)
Firm Size	0.0228***	0.0027	0.0113	0.0193	0.0437	−0.4537	−0.0144
	(0.002)	(0.003)	(0.009)	(0.023)	(0.029)	(0.376)	(0.047)
Board Size	0.0064***	0.0129***	0.0400***	0.1010***	0.1228***	0.5238***	0.0177
	(0.002)	(0.003)	(0.009)	(0.019)	(0.028)	(0.090)	(0.012)
Independent	−0.0017	−0.0013	−0.0168**	−0.0051	−0.0551*	0.1932**	−0.0159
	(0.002)	(0.003)	(0.009)	(0.020)	(0.028)	(0.089)	(0.012)
New CEO	0.0054	−0.0040	−0.0262	−0.0335	−0.0719	−0.0859	−0.0175
	(0.006)	(0.010)	(0.032)	(0.096)	(0.120)	(0.279)	(0.028)
Tenure	0.0007**	−0.0004	0.0004	−0.0046	0.0029	0.0098	−0.0023
	(0.000)	(0.000)	(0.002)	(0.005)	(0.006)	(0.027)	(0.002)
L.ROA	−0.0002	−0.0008**	−0.0021**	−0.0058***	−0.0066**	−0.0075	−0.0000
	(0.000)	(0.000)	(0.001)	(0.002)	(0.003)	(0.008)	(0.001)
L.Q	0.0145***	0.0068**	0.0232**	0.0625**	0.0919***	0.1692	0.0224
	(0.002)	(0.003)	(0.010)	(0.024)	(0.034)	(0.148)	(0.016)
L.LinkedD_pct		0.0193	0.0048	0.2735	0.0768	−8.1866***	−0.9928***
		(0.020)	(0.073)	(0.192)	(0.258)	(1.111)	(0.132)
N	6170	5953	1538	5953	1538	1041	1538
R^2	0.087	0.026	0.046				0.096
pseudo R^2				0.061	0.043	0.233	

a statistically different from zero in all the alternative specifications. However, this negative relation between managerial power and the selection of a linked director could respond to different reasons. On one hand, one can hypothesize that CEO's in highly entrenched firms are already powerful enough to not to need to engage in window dressing by appointing these particular type of directors and then co-opting them. Opposite, we could think that low entrenchment firms have a higher proportion of NPO linked directors because of their high monitoring skills and their contribution to better governance. Moreover, the final implications of such a dynamic and board structure for shareholders is unclear. To shed light on this problem, the next section provides evidence on the link between the incidence of NPO linked directors, firm value, and monitoring intensity in the next section of the paper.

3.3.2 Non profit ties and firm outcomes

Post SOX reforms have increased the requirements of director independence for the sake of improving monitoring. Yet, there are mixed results in the governance literature about the relation between independence and firm value. Following Fracassi and Tate (2012), we start by analysing whether the failure to account for ties of independent directors to the non profit sector contributes to this empirical puzzle. Table 3.3 displays results for pooled OLS regressions of Tobin's Q on the fraction of independent directors on the board, controlling for board size, firm size, market leverage, and the E-index. Tobin's Q (computed as the natural logarithm of one plus the ratio of book value of assets, plus market value of equity, minus book value of equity scaled by total assets) is used to measure firm value maximization, following Hermalin and Weisbach (1991), Fracassi and Tate (2012), Morck et al. (1990) and Adams et al. (2005). Recent work by Dybvig and Warachka (2012) highlight the potential endogeneity issues in measures such as ROA and Tobin's Q to account for firm performance and propose two operating efficiency measures as alternatives. In non-reported robustness checks, these alternative measures have been used instead of Tobin's Q. The main results of this paper remain unchanged both in the sign of the main coefficients and their statistical significance when the alternative measures are used.

Table 3.3: Independent Directors and firm value Dependent variable is the natural logarithm of Tobin's Q measured as 1 plus book value of assets plus market value of equity, minus book value of equity divided by total assets. *E-index* is the entrenchment index constructed as in Bebchuk at al. (2009). *Firm size* is the log of total assets. *Board size* is the total number of directors appointed at aboard in a year. *Independent* is the ratio of independent directors scaled by board size. *Links Adjusted Independent* is the ratio of independent directors excluding those that have at least one connection to a non profit organization. Industry fixed effects are 2 digits SIC codes fixed effects. Standard errors are clustered at the firm level. t-statistics reported in parentheses. *, ** and *** represent significance levels at 10%, 5% and 1% respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Independent	0.0004	0.0037	0.0023			
	(0.10)	(1.01)	(0.70)			
Links Adjusted Independence				−0.0138***	−0.0121***	−0.0093***
				(−4.78)	(−4.02)	(−3.26)
Firm Size	0.0057	0.0052	0.0209***	0.0038	0.0036	0.0173***
	(1.20)	(1.08)	(4.13)	(0.81)	(0.76)	(3.49)
Board Size	−0.0069**	−0.0104***	−0.0086***	0.0016	−0.0004	−0.0016
	(−2.15)	(−3.04)	(−2.84)	(0.57)	(−0.13)	(−0.59)
Leverage	−0.7709***	−0.7415***	−0.6521***	−0.7635***	−0.7355***	−0.7231***
	(−27.87)	(−26.77)	(−21.74)	(−28.09)	(−26.98)	(−25.33)
E-index	−0.0158***	−0.0124***	−0.0139***	−0.0124***	−0.0092**	−0.0101**
	(−3.92)	(−2.92)	(−3.61)	(−3.05)	(−2.14)	(−2.50)
Industry fixed effects	No	No	Yes	No	No	Yes
Year fixed effects	No	Yes	Yes	No	Yes	Yes
Observations	7263	7263	7263	7263	7263	7263
R^2	0.316	0.333	0.527	0.321	0.336	0.408

Table 3.3 shows that board size, leverage and entrenchment are always negatively correlated to firm value. We also find no significant coefficient for the number of independent directors on the board (columns 1, 2 and 3). In columns 4, 5 and 6 the table shows results for the same specifications but using the *adjusted number of independent directors* computed as the number of independent directors at the board minus the independent directors with at least one connection to the non profit sector. While board independence (this is independence to be in compliance with listing requirements) doesn't seem to have any relation with firm performance, the adjusted number of independent directors presents larger, negative and statistically significant coefficients. This finding provides empirical evidence of the importance of accounting for NPO ties in the definition of independence of a non-employee director and their potential influence on firm value.

However, these results are difficult to interpret because they are subject to the same endogeneity concerns that make the pooled OLS regression of Tobin's Q on board independence difficult to interpret. In the cross section, some firms may be better than others and low director independence may be a symptom and not the cause. Board composition may also vary with firms strategy and those differences in strategy may be responsible for any differences in performance.

In the time series, firms may increase board independence (or remove directors with ties) when performance is weak. Also, firms may adjust board composition as they adjust their strategies over time. The next step needed is to account for such firm characteristics using firm fixed effects.

In table 3.4 Tobin's Q is regressed on the ratio of linked independent directors over total number of independent directors on the board introducing firm fixed effects to control for firm specific time invariant unobserved heterogeneity and year fixed effect. Column 1 shows the overall effect of a change in the proportion of linked directors at the board level. Compared to the pooled OLS results, we find that there is no statistically significant effect of a change in the fraction of linked directors at the board level on Tobin's Q after taking into account firm specific time invariant unobserved heterogeneity.

However, the influence of a director in the board is not given solely by it's participation at the board as a whole, but also in more specific decisions at certain committees.Independent directors serve both at board meetings and at specific meetings at different committees formed by a smaller number of directors who focus (and take responsibility) on monitoring the executive team in regard with specific activities. The four most common committees in U.S boards are the *auditing* committee, the *compensation* committee, *nominating* committee and the *governance* committee. The frequency, regulation and composition of each committee varies greatly, as well as the type of decisions made in each committee and the potential conflict of interest with the CEO. It is also likely that the bargaining power of an independent director comes from their actions and decisions taken inside each of these committees. Then, the CEO would need to exert more influence over those independent directors who have more direct influence over his personal interests. Probably, the two committees where the conflict of interest with the CEO is more straightforward is the compensation and the auditing committees. In table 3.4, columns 2 and 3 show the regression of Tobin's Q on the fraction of independent directors with links at the compensation and auditing committees. According to results displayed in column 2, an increase in the fraction of independent directors with NPO links sitting at the compensation has a negative effect on firm value. The effect is statistically significant at the 10%. Opposite, changes in the fraction of linked directors inside the auditing committees has a positive coefficient (column 3), but not statistically different from zero. The analysis does not consider the nomination and governance committees since across the sample used in this study there is a huge overlap between the compensation and the governance committee. Moreover, the level of activity of the nomination committee is rather low (fewer meetings per year). In non-reported results similar analysis has been done considering separately the nominating an governance committees. As with the auditing committee, changes in the fraction of board members with links at governance and nominating committees present coefficients not statistically different from zero. In the reminder of the paper I will focus the analysis in changes in the composition of linked independent directors at the compensation committee.

3.4 Endogeneity of board structure and empirical strategy

The results of the previous section provide evidence that the presence and the relative position of a linked director at the board have a correlation with the firm's value. However, boards of directors are endogenous institutions (Hermalin and Weisbach, 1998). Unless strong assumptions are made, a causal analysis using cross sectional data is difficult because there is a potential reverse causality problem. It is not easy to disentangle whether firms are choosing a certain

Table 3.4: Fraction of linked directors at the board and committees. Dependent variable is the natural logarithm of Tobin's Q measured as 1 plus the ratio of book value of assets + market value of equity, minus book value of equity divided by total assets. *LinkedD_pct* is the fraction of independent directors appointed in a certain year at a board that simultaneously participate of a non profit organization. *CCLinked_pct* is the ratio of NPO linked independent directors appointed in the compensation committee scaled by the number of independent directors at the committee. *ACLinked_pct*, *GCLinked_pct* and *NCLinked_pct* are equivalent measures for the auditing, governance and nomination committees respectively. *E-index* is the entrenchment index constructed as in Bebchuk et al. (2009). *Firm size* is the log of total assets. *Board size* is the total number of directors appointed at aboard in a year. *Independent* is the ratio of independent directors scaled by board size. *Leverage* is long-term debt plus debt in current liabilities, divided by the numerator plus market equity. Industry fixed effects are 2 digits SIC codes fixed effects. Standard errors are clustered at the firm level. t-statistics reported in parentheses. *, ** and *** represent significance levels at 10%, 5% and 1% respectively.

	(1)	(2)	(3)
LinkedD_pct	0.0154		
	(0.48)		
CCLinked_pct		−0.0471*	
		(−1.67)	
ACLinked_pct			0.0052
			(0.18)
Independence	−0.0017	0.0090	0.0085
	(−0.05)	(0.19)	(0.19)
Firm Size	−0.0950***	−0.1050***	−0.1032***
	(−7.00)	(−6.10)	(−6.13)
Leverage	−0.4811***	−0.5143***	−0.5160***
	(−17.04)	(−13.49)	(−13.80)
Board Size	−0.0083***	−0.0079***	−0.0076***
	(−4.51)	(−3.34)	(−3.28)
E-index	−0.0136***	−0.0113**	−0.0104**
	(−3.89)	(−2.44)	(−2.26)
Year fixed effects	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes
Observations	7257	4321	4454

governance structure as a response to their bad performance or if they are having bad performance as a result of the chosen governance institutions.

Moreover, regressing a cross-section of the dependent variable (such as performance or executive compensation) on to the independent variable (linked directors) leads to an omitted variable bias. There is unobserved firm level heterogeneity, such as CEO's managerial skills or firm strategy, that cannot be explicitly taken into account in the empirical model to be estimated. The inclusion of omitted variables in the error term leads to inconsistent estimates of the parameters of interest.

An alternative to cross sectional analysis is to use firm fixed effects in order to control for time invariant firm characteristics that are unobservable and that might be jointly affecting performance/compensation and board structure. This is, using firm fixed effects one controls for unobserved individual heterogeneity that might be correlated with the regressors.

Opposite to random effects and pooled OLS, fixed effects models (FE) allow to establish causation without the need to make strong assumptions about the model. The within estimator for a fixed effects model results is a consistent parameter and results can be interpreted as the causative effect of a change in the proportion of linked directors in a firm with movements in the dependent variable of interest, this is the marginal effect of a change in our regressors. Firm fixed effects is useful in this type of data because it allows us to study the effect of a *change* in the number of linked directors on the dependent variable of interest.

However, firm fixed effects also suffer from a large number of limitations as identification strategy in corporate governance. First of all, it only accounts for time invariant unobserved heterogeneity across firms, leaving time variant unobservables as a potential source of omitted variable bias. Second of all, it assumes that there is enough time series variability in the regressors. One could argue that there is not sufficient variability in board structure for a within estimator, and if there were any variation in the board or committee structure,then it would also be endogenous. Another critique to firm fixed effect as a solution to endogeneity issues in performance - board structure regressions is posed by Wintoki et al. (2012) who draw attention to the dynamics of observable variables related to corporate governance as a third source of endogeneity in governance empirical literature (besides unobserved heterogeneity and simultaneity). Past performance can be driving simultaneously changes in current performance and board structure violating the sequential exogeneity assumption required to obtain consistent estimates from a firm fixed effect estimation.

Then, the next step is to measure the impact of NPO-linked directors on firm value and CEO pay using a better empirical strategy to address, to the extent possible, the endogeneity concerns related to board composition. The empirical strategy is to use a subset of changes in the number of linked directors that are plausibly unrelated to firm performance. Specifically, I consider decreases in the number of linked directors in the compensation committee due to director retirements in a similar way used by Fracassi and Tate (2012) A director departure is labelled as a retirement if the director is at or beyond the company's mandatory retirement age. These events allow to identify sets of treated and control firms. In my sample there are 274 retirement events happening inside the compensation committee of which 157 happen inside compensation committees with at least one NPO-linked director. 25 out of those 157 retirement are events corresponding to NPO-linked directors retirements.

The main identification source of this paper is to compute the difference in value changes around the two types of events, linked and not linked retirement. The differences-in-differences approach (DID) corrects for other (unobserved) factors that might be associated with the retirement of directors and provides a clear and exogenous source of change in the board structure.

Every firm in the sample has at least one director connected to a nonprofit organization appointed at the compensation committee. One should not simply make a comparison between firms appointing linked directors and firms which are not linked to a nonprofit. The differences-in-differences framework consists of an indicator variable called CCR (compensation committee retirement) that takes the value of 1 for each full fiscal year after the retirement of an independent director from a compensation committee. The specification also includes the interaction of CCR with an indicator for connected retirements (CCLR). While the "treatment" is the retirement of an independent director with ties to a NPO, the "control" group is the retirement of an independent director *without* links to an NPO. Both treatment and control events happen inside compensation committees with at least one linked independent director. Then, Tobin's Q is regressed on CCR and the interaction CCLR.

To ease the interpretation, I restrict the analysis only to isolated retirements. This means no successive retirements inside the compensation committee happen neither 1 year before, nor 1 year after the retirement event under consideration. The coefficient of the interaction (CCLR) captures the difference-in-differences, this is the impact of reducing the number of NPO linked directors on the value change. All specifications contain firm fixed effects and only include retirement events for which we can observe at least one year before the retirement year and one year after the retirement. In all regressions standard errors are also clustered at the firm level to correct for within-firm serial correlation of the residuals.

All regressions will be run in the symmetric window of + 3 years around the year where the retirement event took place, as long as information is available. The sample is split by entrenchment level, measured using the E-index, in order to analyze if different governance mechanisms are substitutes or complementary, and test alternative hypothesis. I will consider 4 non-mutually exclusive groups of firms in terms of the entrenchment index. While the median of E-index is strictly 3, this includes more than 78% of the sample, cutting E-index at 2 splits the linked compensation committees in two groups (more precisely at 46%, which is more closely to the median level). In the remainder of this paper low entrenchment firms are defined as those firms with$E - index \leq 2$, mid-low entrenchment firms will be those with $E - index \leq 3$, mid-high entrenchment firms will be those with $E - index \geq 3$, and finally high-entrenchment firms will be those with $E - index > 3$.

3.4.1 Firm Value

Table 3.5: Firm value and the retirement of a connected independent director from a compensation committee. Dependent variable is the natural logarithm of Tobin's Q measured as 1 plus the ratio of the book value of assets + market value of equity, minus book value of equity divided by total assets. CCR is a dummy variable equal to 1 the three following years of a retirement of a member of a compensation committee. CCLR is a dummy variable equal to 1 if the director that retires form the compensation committee has a connection to a NPO. E-index is the entrenchment index constructed as in Bebchuk at al. (2009). Firm size is the log of total assets. Board size is the total number of directors appointed at aboard in a year. Independence is the ratio of independent directors scaled by board size. Leverage is long-term debt plus debt in current liabilities, divided by the numerator plus market equity. Standard errors are clustered at the firm level. t-statistics reported in parentheses. *, ** and *** represent significance levels at 10%, 5% and 1% respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				$E \leq 2$	$E \leq 3$	$E \geq 3$	$E > 3$
CCR	0.0219	0.0207	0.0126	0.0292	0.0221	−0.0123	−0.0194
	(0.78)	(0.77)	(0.50)	(0.75)	(0.79)	(−0.32)	(−0.30)
CCLR	−0.0183	0.0012	0.0373	0.1068***	0.1978**	0.0560	−0.2639**
	(−0.27)	(0.02)	(0.60)	(3.06)	(2.03)	(0.57)	(−2.11)
Firm Size		−0.1474***	−0.1354**	−0.1946**	−0.1823***	−0.1429**	−0.2390*
		(−3.13)	(−2.47)	(−2.24)	(−2.66)	(−2.11)	(−1.93)
Board Size		0.0048	−0.0002	−0.0093	−0.0007	0.0011	0.0141
		(0.66)	(−0.03)	(−0.64)	(−0.07)	(0.11)	(1.02)
Independence		0.0853	−0.0264	−0.1944	−0.0922	0.0162	0.1228
		(0.55)	(−0.19)	(−0.60)	(−0.55)	(0.10)	(0.44)
Leverage		−0.3867***	−0.4730***	−0.0745	−0.0653	−0.5622***	−0.9498***
		(−3.59)	(−3.85)	(−0.41)	(−0.42)	(−3.02)	(−4.20)
E-index			0.0014				
			(0.13)				
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obervations	490	489	445	175	333	270	112
$Adj.R^2$	0.320	0.447	0.442	0.385	0.438	0.498	0.550

Column 1 of Table 3.5, presents a baseline regression without controls for firm observable characteristics, but with year and firm fixed effects. The overall change is not statistically significant (CCR and CCLR coefficients), although the retirement of a linked director presents a negative coefficient (-.0183). The sign of this coefficient changes as we introduce controls, but it remains not-significant as long as we pool all the firms together (columns 2 and 3). Columns (4) to (7) present results for different subsets of firms corresponding to different levels of entrenchment (proxy for managerial power). The retirement of an independent director from the compensation committee (CCR) is not statistically different from zero in any subgroup of firms of managerial power. However, the retirement of a linked independent director from a compensation committee (coefficient CCLR) which captures the DID effect, presents significant and positive values for firms with low and mid-low entrenchment levels. For firms with low entrenchment firms, the retirement of a linked independent director from the compensation committee has an effect of 0.1068 which is significant at the 1%. In column (5), the effect of a retirement of an independent director with links from a compensation committee in a firm with mid-low entrenchment level has an effect on Tobin's Q of 0.1978, significant at the % 5. The results of columns (4) and (5) are consistent with the interpretation of a increase on firm value after the retirement of a connected director or, put in another words, a reduction of the participation of NPO linked directors has a positive effect on firm performance in the years following the retirement. Columns (6) and (7) show the results for mid and mid-high entrenchment boards. While the effect of a retirement of a NPO-linked director in firms with $E \leq 3$ is positive (0.056) , it is smaller that the one observed for the group of low entrenchment firms and it is not statistically significant. For firms with high entrenchment ($E>3$, strictly above the median) the effect of interest changes in sign and it is the largest in magnitude. The effect of a retirement of a linked director appointed at the compensation committee in the firm value is -0.2639 and statistically different from zero at the 5%. The interpretation of these results is twofold. On one hand we find that the retirement of NPO connected directors at the compensation committee matters and has a significant effect on firm performance when we control for observed firm characteristic's and time invariant frim characteristics. On the other hand, we can interpret that the overall effect of this connected directors is related to the bargaining power of the CEO. In firms where the CEO already has a high bargaining power, the personal treats of NPO linked directors seem to play a role improving the governance of the firm. This is, when the CEO is already powerful he does not need to exert his influence over linked directors enticing them with possible charitable donations the their organizations of interest. When the CEO is in a somehow legal or institutional weak position, the presence of NPO linked directors seem to be a target for the CEO to increase his power. Hence, the positive effect of their retirement from low entrenchment firms. When the proportion of NPO-linked directors decreases from the compensation committee the CEO looses targets to exert power and the overall governance of the firm improves, translating into an increase in firm performance the following years.

Thus far, results are consistent with the hypothesis that CEOs in low entrenchment firms use NPO-linked independent directors in their struggle or bargain to increase their power. In high entrenchment firms they are already enjoying the "quiet life" and there is little that NPO-linked directors can offer to them. Unless the CEO foresees a troublesome situation in the future where he might need an NPO-linked director's help, there is no exchange opportunity with them. Opposite, in firms with good governance (low level of entrenchment index) CEOs need to fight for the position at the firm, and in that scene NPO-linked directors have an attractive position that can be exploited by CEOs in the way of entrenchment.

3.4.2 CEO Pay structure and bargaining power

Since the main focus of this paper is the composition of compensation committees, it is natural to focus in the effect of the presence of NPO-linked directors for different levels of managerial entrenchment in the level and composition of pay. Moreover, using executive pay as the outcome variable has the advantage of using a dependent variable measured and set on yearly basis, which the same periodicity of board members elections and retirements.

This section develops results using the differences-in-differences strategy around retirement events with alternative CEO pay variables as outcomes. We will use total pay and it's components separately (salary, bonus, stocks and options).

Pay level and design is the main responsibility and outcome of compensation committees activity. Executives incentives clearly imposes a conflict of interest. CEO's rather to get paid as much as possible, while shareholders want to provide the right incentives to CEO's to align their interest with his. Thus, total pay is the total dollar value of different components of pay. Some of these components of pay are tied to firm performance, while others belong to a more discretionary realm. Salary is probably the most discretionary component of pay since it is not mechanically tied to any form performance or valuation measure. Opposite, equity pay components (stocks and stock options) are highly dependent and increasing on firm market value and firm performance.

Table 3.6 shows that the retirement of a director from a linked compensation committee has a positive and statistically significant effect on the level of total pay. This positive effect is statistically significant at 5% in low and mid-low entrenchment firms (columns 4 and 5), but changes the sign going from a positive to a negative effect of the retirement of a linked director, and looses all the statistical power in high entrenchment firms (columns 6 and 7).

Table 3.6: CEO total pay and the retirement of a connected independent director from a compensation committee. Dependent variable is the natural logarithm of TDC1 (as reported in ExecuComp's AnnComp table). CCR is a dummy variable equal to 1 the three following years of a retirement of a member of a compensation committee. CCLR is a dummy variable equal to 1 if the director that retires form the compensation committee has a connection to a NPO. E-index is the entrenchment index constructed as in Bebchuk at al. (2009). Firm size is the log of total assets. ROA is the natural logarithm of 1 plus the ratio of net income plus interest expense, scaled by the lag of total assets. Q is the natural logarithm of 1 plus book value of assets + market value of equity, minus book value of equity divided by total assets. Return is the the natural logarithm of 1 plus lagged firm stock annual return. All specifications include firm and year fixed effects. Standard errors are clustered at the firm level. t-statistics reported in parentheses. *, ** and *** represent significance levels at 10%, 5% and 1% respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				$E \leq 2$	$E \leq 3$	$E \geq 3$	$E > 3$
CCR	0.0840	0.0714	0.1157	−0.0886	0.1400	0.2362	0.0216
	(0.70)	(0.61)	(0.95)	(−0.40)	(0.89)	(1.36)	(0.10)
CCLR	0.3744**	0.3408**	0.3582***	0.5692***	0.4884***	0.2939	−0.5754
	(2.56)	(2.54)	(2.64)	(3.84)	(2.83)	(1.66)	(−1.14)
Firm Size	0.2705**	0.3625***	0.3365***	0.0290	0.2469*	0.3523***	−0.1941
	(2.04)	(2.63)	(2.77)	(0.08)	(1.97)	(2.86)	(−0.47)
ROA	−0.4078	−0.4084	−0.5517**	−0.3122	−0.6743***	−1.2648**	−0.2822
	(−1.23)	(−1.42)	(−2.16)	(−0.70)	(−2.73)	(−2.24)	(−0.26)
Return	0.3519***	0.3406***	0.3443***	0.3437	0.2694*	0.4303***	0.1203
	(3.05)	(3.06)	(2.88)	(1.50)	(1.79)	(2.97)	(0.85)
Tenure	0.0115	0.0107	0.0063	0.0120	0.0099	−0.0052	0.0028
	(1.60)	(1.49)	(0.91)	(1.39)	(1.52)	(−0.46)	(0.08)
Q		0.5575*	0.5762*	−0.4835	0.1855	1.0092***	−0.0288
		(1.87)	(1.78)	(−0.92)	(0.48)	(3.27)	(−0.04)
E-index			0.0054				
			(0.12)				
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	423	423	397	158	293	239	104

The interpretation of these results should be done in the context of the results of the previous section on firm value. The positive and significant results of linked directors retirement coincide with the tranches of entrenchment index where the retirement of these directors was followed with an improvement on firm performance. All specifications introduce controls for firm performance (ROA, one year stock return and Tobin's Q), however these measures are not enough to capture the total effect of firm performance on CEO pay. While total pay is a function of firm performance, we don't know the actual functional form that connects firm performance with CEO pay. As mentioned above, total pay is composed by different compensation packages if which several are closely tied to firm performance indicators. An improvement in firm maximizing value would automatically translate in an increase on the level of such components (as it does in columns 4 and 5) and a reduction of firm value may translate in a reduction of total pay (as it does in column 7, although not statistically significant).

The influence of compensation committee members should not only be visible in the level of total pay but also in pay structure. This is the portions of pay in the form of equity pay (stocks and option), bonus and salary.

Table 3.7 shows regressions of the natural logarithm of salary on the retirement of a member of the compensation committee. Salary is the most discretionary portion of pay. Is it not linked on performance goals and it is payed mostly in the form of cash. As expected, no performance measure introduced as a control in these specifications is statistically significant. Again, spliting the sample into groups of entrenchment provides different results for the main coefficient of interest (CCLR). For firms with low and mid-low entrenchment the retirement of a NPO-linked director is followed by a decrease in salary (columns 4 and 5). This effect is both economically and statistically significant. This is, when a linked director retires from the board in a low entrenchment firm, in the following years CEOs face a reduction of their salary. In firms with mid and high level of entrenchment (columns 6 and 7) the retirement of a linked independent director is followed by an increase in in the level of salary. However, the size of the effect is much smaller than in the group of firms with low managerial power and not statistically different from zero.

Further, in non reported results, similar regressions using the ratio of salary on total pay as a dependent variable show that after the retirement of a connected director from a compensation committee, the percentage of salary on total pay drops 26% and 19% with a 1% significance level in low entrenchment firms, while it increases 18% in high entrenchment firms (10% significance). Both results in terms of level and percentage of salary in total pay are consistent with higher amounts of pay to CEOs with the precence of NPO-linked directors at the compensation committee.

The second component of pay under study is *bonus*. Table 3.8 show regressions where the dependent variable is the natural logarithm of Bonus. The interaction term of interest (again CCLR) is positive in all groups of firms, except for high entrenchment companies where the coefficient of the interaction is negative, implying a reduction in bonus pay in high entrenchment firms after the retirement of a linked NPO director. However, none of these specifications present coefficients statistically different from zero. It is worth to mention that, unlike the case of salary, when the dependent variable is bonus alternative measures of firm performance are statistically significant.

In table 3.9 columns 1 to 5 show results for specifications where dollar value of stock grants in a certain year is the dependent variable. Columns 6 to 10 show results for regressions where the dependent variable is the dollar value of option grants. In both panels, the retirement of a linked director from a low entrenchment firm seems to have an effect on equity pay. There is a significant reduction of equity pay with a 5% significance level, and an increase in option pay (10% significance level). Opposite, mid high entrenchment firm experience an increase in stock option pay (significant at the 10% level). This is, there is weak evidence that the removal of a member of the compensation committee with links causes a *shift* in the equity package from stocks to options in low entrenchment firms. Interpreting these results in the governance framework is difficult. One could argue that a reduction of shares and an increase in options represents a switch from short term to long term incentives. However, it is not clear what kind of incentives structure is the most desirable from the shareholders perspective.

Table 3.7: CEO annual salary and the retirement of a connected independent director from a compensation committee. Dependent variable is the natural logarithm of SALARY as reported in ExecuComp AnnComp table. CCR is a dummy variable equal to 1 the three following years of a retirement of a member of a compensation committee. CCLR is a dummy variable equal to 1 if the director that retires form the compensation committee has a connection to a NPO. E-index is the entrenchment index constructed as in Bebchuk at al. (2009). Firm size is the log of total assets. ROA is the natural logarithm of 1 plus the ratio of net income plus interest expense, scaled by the lag of total assets. Q is the natural logarithm of 1 plus book value of assets + market value of equity, minus book value of equity divided by total assets. Return is the the natural logarithm of 1 plus lagged firm stock annual return. All specifications include firm and year fixed effects. Standard errors are clustered at the firm level. t-statistics reported in parentheses. *, ** and *** represent significance levels at 10%, 5% and 1% respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				$E \leq 2$	$E \leq 3$	$E \geq 3$	$E > 3$
CCR	0.0319	0.0283	−0.0434	0.1299	0.1182*	−0.2258	−0.2848
	(0.26)	(0.23)	(−0.41)	(1.55)	(1.74)	(−1.39)	(−1.13)
CCLR	−0.1036	−0.1152	−0.0407	−0.2447**	−0.2482**	0.0809	0.1638
	(−0.70)	(−0.75)	(−0.35)	(−2.30)	(−2.45)	(0.78)	(0.46)
Firm_Size	0.1956	0.2263*	0.1196	0.1364	0.1718***	0.0099	−0.1309
	(1.63)	(1.74)	(1.28)	(0.46)	(3.52)	(0.12)	(−0.48)
ROA	0.5542	0.5541*	0.2655	0.2706	0.2318	−0.4870	0.6975
	(1.60)	(1.68)	(1.15)	(0.94)	(1.06)	(−1.06)	(0.78)
Return	−0.0756	−0.0793	0.0383	−0.0992	−0.0180	0.2068**	0.1474
	(−0.53)	(−0.56)	(0.51)	(−0.72)	(−0.22)	(2.26)	(0.97)
Tenure	0.0049	0.0046	0.0024	0.0067	0.0109	−0.0050	−0.0657
	(0.52)	(0.49)	(0.25)	(0.86)	(1.27)	(−0.24)	(−0.61)
Q		0.1867	0.1109	−0.3166	−0.0780	0.2867	−0.0659
		(0.89)	(0.53)	(−0.72)	(−0.36)	(1.47)	(−0.22)
E-index			0.0285				
			(1.02)				
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	427	427	400	161	296	239	104

Overall,the empirical findings seem to indicate that NPO-linked directors are relevant in the bargaining process for the determination of CEO pay when they participate of the compensation committee. In most of the specifications, the removal of a director (CCR) has a coefficient that is not statistically different from zero. Opposite, there is a statistically and economically significant coefficient for the retirement of NPO-linked directors (CCLR).

In non reported robustness checks, a similar analysis with the same identification strategy was performed using the retirement of connected directors in other committees. None of those retirements has any statistical significant impact on any of the compensation components. These results reinforce the idea that the role of NPO-linked directors at the compensation committee are influential and that results are not driven by other changes in board structure.

3.4.3 Earnings Management

Earnings management is the use of accruals to change reported earnings by temporarily rising or reducing income using discretionary accruals. As accruals are parts of earnings that are not reflected in current cash flows, there is a great deal of managerial discretion into their construction and imputation. This section employs the same empirical strategy as in previous sections, using annual discretionary accruals as the dependent variable.

Table 3.8: CEO annual bonus and the retirement of a connected independent director from a compensation committee. Dependent variable is the natural logarithm of BONUS as reported in ExecuComp AnnComp table. CCR is a dummy variable equal to 1 the three following years of a retirement of a member of a compensation committee. CCLR is a dummy variable equal to 1 if the director that retires form the compensation committee has a connection to a NPO. E-index is the entrenchment index constructed as in Bebchuk at al. (2009). Firm size is the log of total assets. ROA is the natural logarithm of 1 plus the ratio of net income plus interest expense, scaled by the lag of total assets. Q is the natural logarithm of 1 plus book value of assets + market value of equity, minus book value of equity divided by total assets. Return is the the natural logarithm of 1 plus lagged firm stock annual return. All specifications include firm and year fixed effects. Standard errors are clustered at the firm level. t-statistics reported in parentheses. *, ** and *** represent significance levels at 10%, 5% and 1% respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				$E \leq 2$	$E \leq 3$	$E \geq 3$	$E > 3$
CCR	0.1923	0.1711	0.3183	−10.033	0.2110	1.4425*	0.7693
	(0.31)	(0.28)	(0.47)	(−0.92)	(0.24)	(1.87)	(0.66)
CCLR	0.8635	0.7968	10.552	0.3645	0.2475	11.732	−27.874
	(0.88)	(0.82)	(0.96)	(0.65)	(0.20)	(0.89)	(−1.34)
Firm_Size	0.7406*	0.9174*	0.9574**	11.741	0.8067	1.9013***	−0.1912
	(1.93)	(1.97)	(2.01)	(0.71)	(1.44)	(3.82)	(−0.11)
ROA	16.763	16.756	19.681	−20.535	−0.8369	6.6867*	17.9347***
	(0.89)	(0.97)	(0.99)	(−1.19)	(−0.64)	(1.68)	(3.04)
Return	−0.1378	−0.1596	0.0856	1.2832*	0.2857	−1.3756*	−19.617
	(−0.34)	(−0.39)	(0.19)	(1.99)	(0.67)	(−1.71)	(−1.53)
Tenure	−0.0369	−0.0383	−0.0514	−0.0698	−0.0460	−0.1219*	0.0769
	(−0.64)	(−0.66)	(−0.90)	(−0.84)	(−0.66)	(−1.81)	(0.60)
Q		10.758	0.7228	−4.5789**	−0.0662	2.9612*	24.260
		(0.94)	(0.59)	(−2.57)	(−0.04)	(1.91)	(0.83)
E-index			0.3454				
			(1.47)				
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	427	427	400	161	296	239	104

One would expect that the composition of the auditing committee (and not the compensation committee) to be the explanatory variable of interest, when discretionary accruals are the left hand side variable. However, in non reported results, I have performed a similar analysis using changes in the auditing committee and not significant results were found. These findings also strengthen the idea that directors at the compensation committee are in a more relevant bargaining position with regards to the CEO compared to member of other committees.

In table 3.10 I use as a dependent variable the absolute value of discretionary accruals computed following Jones' modified model as described by Dechow et al. (1995). Unfortunately, in these specifications I cannot split the sample into different entrenchment levels because I have fewer observations and some groups would have missing cases. The analysis is restricted to the overall effect on the entire sample. The specifications in columns 1 to 4 include controls for firm performance and firm characteristics, as well as controls for governance. Similar to previous results, the retirement of a director (CCR) presents a positive effect but not statistically different from zero, while the retirement of a NPO-linked director (CCLR) has a negative and statistically significant (10%) effect. This indicates that earnings management activity decreases in the 3 years following the retirement of a connected director to the non-profit sector.

Table 3.9: Equity components of annual total pay and the retirement of a connected independent director from a compensation committee. CCR is a dummy variable equal to 1 the three following years of a retirement of a member of a compensation committee. CCLR is a dummy variable equal to 1 if the director that retires form the compensation committee has a connection to a NPO. E-index is the entrenchment index constructed as in Bebchuk at al. (2009). Firm size is the log of total assets. ROA is the natural logarithm of 1 plus the ratio of net income plus interest expense, scaled by the lag of total assets. Q is the natural logarithm of 1 plus book value of assets + market value of equity, minus book value of equity divided by total assets. Return is the the natural logarithm of 1 plus lagged firm stock annual return. Tenure is the number of years since the CEO has been appointed. All specifications include firm and year fixed effects. Standard errors are clustered at the firm level. t-statistics reported in parentheses. *, ** and *** represent significance levels at 10%, 5% and 1% respectively.

	Panel A: Stock grants					Panel B: option grants				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
		$E \leq 2$	$E \leq 3$	$E \geq 3$	$E > 3$		$E \leq 2$	$E \leq 3$	$E \geq 3$	$E > 3$
CCR	0.9968	2.0478*	0.9016	0.0234	18.605	−0.3752	−0.6369	−0.6440	−0.8056	0.2964
	(1.25)	(1.73)	(1.01)	(0.02)	(1.09)	(−0.58)	(−0.74)	(−0.88)	(−0.75)	(0.24)
CCLR	12.914	−2.9463**	27.636	2.2225*	0.0014	0.8932	1.7810*	−0.9880	15.489	−0.3093
	(1.05)	(−2.65)	(1.22)	(1.85)	(0.00)	(0.89)	(1.82)	(−0.69)	(1.17)	(−0.17)
Firm_Size	0.1527	−0.3337	0.2491	0.6504	0.7649	0.1063	0.7523	0.9909	0.0553	−20.687
	(0.25)	(−0.12)	(0.27)	(1.10)	(0.28)	(0.21)	(0.36)	(1.48)	(0.10)	(−1.24)
Return	1.7504***	0.7773	1.0306*	2.9168***	2.8184***	0.8817*	1.4832**	1.1084**	0.6137	−0.2957
	(3.40)	(0.77)	(1.70)	(4.20)	(2.79)	(1.94)	(2.23)	(2.11)	(0.98)	(−0.36)
ROA	−3.8234***	−5.6370**	−3.4795**	−43.638	−17.583	−4.6667***	−25.379	−3.6122***	−6.1164**	−13.7983***
	(−2.78)	(−2.21)	(−2.46)	(−1.62)	(−0.25)	(−3.56)	(−1.38)	(−2.82)	(−1.99)	(−2.92)
Tenure	0.0118	−0.0097	−0.0281	0.0287	0.2356	−0.0914	0.0171	−0.0727	−0.1766**	−0.0722
	(0.21)	(−0.12)	(−0.44)	(0.48)	(1.59)	(−1.60)	(0.42)	(−1.14)	(−2.30)	(−0.77)
Q	−0.7301	−38.123	−18.433	13.640	−22.911	−0.1167	10.699	0.8991	−0.5908	−4.2425**
	(−0.48)	(−1.32)	(−1.01)	(0.73)	(−0.50)	(−0.10)	(0.36)	(0.53)	(−0.52)	(−2.01)
E-index	−0.3420					0.1201				
	(−1.14)					(0.60)				
Observations	400	161	296	239	104	397	158	293	239	104

Table 3.10: Earnings Management.
Dependent variable is the 1% winsorized discretionary accruals computed according to the modified Jones model as in Dechow et al. (1995). *CCR* is a dummy variable equal to 1 the three following years of a retirement of a member of a compensation committee. *CCLR* is a dummy variable equal to 1 if the director that retires form the compensation committee has a connection to a NPO. *E-index* is the entrenchment index constructed as in Bebchuk et al. (2009). *Firm size* is the log of total assets. *ROA* is the natural logarithm of 1 plus the ratio of net income plus interest expense, scaled by the lag of total assets. *Q* is the natural logarithm of 1 plus book value of assets + market value of equity, minus book value of equity divided by total assets. *Return* is the the natural logarithm of 1 plus lagged firm stock annual return. *SD_ret* is the standard deviation of monthly returns in the last 12 months. *Cash* is the the natural logarithm of ch as reported in Compustat. *Leverage* is long-term debt plus debt in current liabilities, divided by the numerator plus market equity. *New CEO* is a dummy equal to 1 if the CEO has been appointed that year. *Tenure* is the number of years since the CEO has been appointed. All specifications include firm and year fixed effects. Standard errors are clustered at the firm level. t-statistics reported in parentheses. *, ** and *** represent significance levels at 10%, 5% and 1% respectively.

	(1)	(2)	(3)	(4)
CCR	0.0130	0.0148	0.0148	0.0153
	(1.04)	(1.09)	(1.09)	(1.12)
CCLR	−0.0203	−0.0239*	−0.0240*	−0.0287*
	(−1.49)	(−1.93)	(−1.92)	(−1.98)
E-index	−0.0023	−0.0015	−0.0012	−0.0010
	(−0.50)	(−0.33)	(−0.28)	(−0.23)
Firm Size	0.0548**	0.0562**	0.0562**	0.0615**
	(2.17)	(2.36)	(2.36)	(2.43)
Independence	0.1120**	0.1315**	0.1334**	0.1507**
	(2.16)	(2.31)	(2.27)	(2.49)
ROA	0.0944**	0.0934**	0.0949**	0.1020**
	(2.47)	(2.46)	(2.42)	(2.61)
Q	0.0680**	0.0677**	0.0677**	0.0706**
	(2.44)	(2.44)	(2.44)	(2.47)
Leverage	0.0098	−0.0102	−0.0112	−0.0211
	(0.20)	(−0.17)	(−0.19)	(−0.35)
Cash	0.0035	0.0037	0.0037	0.0035
	(0.63)	(0.61)	(0.61)	(0.56)
SD_ret		0.1583	0.1586	0.1208
		(0.97)	(0.97)	(0.73)
New CEO			0.0023	0.0016
			(0.29)	(0.19)
Tenure				−0.0002
				(−0.31)
Observations	347	330	330	327
Adj-R^2	0.138	0.144	0.142	0.153

3.4.4 Limitations of the empirical strategy

The use of retirement of independent directors as a source of exogenous variations poses limitations in the interpretation of the results. First, I measure the impact of NPO-linked directors on value using only within-firm changes in the fraction of linked directors due to independent director retirements. The identification assumption is that retirements are not driven by firm performance itself. Unexpected deaths of independent directors would be an ideal shock for identification, as used in Azoulay et al. (2010). However,the sample period used in this paper doesn't contain enough death-events related to a non-profit organization.

Another concern is the age of directors and how the fact of being near retirement might change their incentives and career concerns. The results show that while the retirement of a director by itself is not statistically significant, the retirement of an NPO-linked director near retirement is statistically significant, showing that they still play an active and relevant role on the board before leaving.

Other limitation is the speed and the type of a replacement when independent directors that retire. If the retirement of a linked director is quickly followed by an appointment of another director with similar characteristic it would be even more difficult to interpret the effect of a retirement on the outcome variables. In the sample of this study 40% of the linked retirements are replaced in the next year of the departure. However, only 10% is replaced by another linked independent director. Non-linked retirements are followed by a replacement in the subsequent year only in 25% of the cases and only 4% of the non-linked directors is followed by the appointment of a linked directors. As expected, in compensation committee the rate and speed of replacement is higher compared to that of the board as a whole, since compensation committees are smaller (an average size of 4 to 5 members). 60% of retirements happening inside the compensation committee are followed by a replacement in the next year. However, only 8% of the linked retirements is replaced by a linked director.

3.5 Discussion and Conclusion

This study contributes to the corporate governance literature and the current debate of what makes a good independent director and what should be their main role at the board. In this paper we study the definition of true independent directors and the relation between independence and firm performance, earnings management and executive compensation.

The study focus in a particular type of independent directors that are simultaneously serving at a corporate board and at the board of a non-profit organization (such as charitable institutions and universities). These directors represent 16% of the board, a percentage even higher than that of women at boards (11% for firms in the sample). NPO-linked directors are considered a positive influence at the board because of their social involvement and at the same time they are seen as potentially captured by the CEO with promises of donations.

To study the effect of the presence of NPO-linked directors in firm value and CEO pay, I use an empirical strategy based on differences-in-differences estimation using retirements of NPO-linked and not linked directors from the compensation committee combined with firm fixed effects. This setting provides an empirical design that control for unobserved heterogeneity at the firm level and provides a reasonable source of exogenous change in the participation of NPO-linked directors. The main findings are that independent directors that have connections exert their influence mostly from their positions at the compensation committee and not from their participation in other committees. The removal of these directors from the compensation committee causes significant changes in firm value, total pay and pay structure. The direction of such changes is dissimilar depending on the level of managerial power, measured as entrenchment index. In low entrenchment firms, their removal translates in an improvement in firm value and firm performance, an increase in total pay but a reduction of discretionary components of pay such as salary. Moreover, the removal of an NPO-linked director from the compensation committee causes a change in the composition of equity pay and a reduction of earnings management in the years after the retirement happens. Opposite, in high entrenchment firms, these directors removal either has no influence in the variables of interest or has an opposite direction (compared to firms with low level of entrenchment) implying that their departure decreases good governance.

These findings support the idea that the monitoring quality of NPO-linked directors will depend on CEO power. In firms where the entrenchment index is low, CEOs might be interested into engage in activities or transactions that increase their power and secure their position. Hence, CEOs have incentives to exploit the weakness of NPO-linked directors for their benefit. Opposite, CEOs that are working at boards where they count with enough institutional or legal protection are not interested in any potential exchange of favors with NPO-linked directors.

These findings reinforce the need for a more specific definition of an independent director and leads for future research related to the study of the dynamic relation between board independence and CEO entrenchment.

3.6 Appendix

3.6.1 Variables definition

ACLinkedD_pct is the ratio of independent directors with links that serves at the compensation committee.

App_ratio is the fraction of new appointments that have links to the non-profit sector.

Board Size Total number of members of a board of directors. Source: BoardEx.

Bonus is the log(BONUS), where BONUS is as as defined in ExecuComp. Measured in thousands.

CCR is a dummy variable equal to 1 in the 3 years after the retirement of an independent director that sits at the compensation commitee and zero otherwise.

CCLinkedD_pct is the ratio of independent directors with links that serves at the compensation committee.

CCLR is a dummy variable equal to 1 in the 3 years after the retirement of an independent director that sits at the compensation commitee and has links to a NPO, and zero otherwise.

DAC is the 1% winsorized discretionary accruals computed according to the modified Jones model as in Dechow et al. (1995)

D_App is a dummy variable equal to 1 if the firm has appointed at least one independent director with links.

E-index defined and constructed by Bebchuk et al. (2009).

Firm Size Natural log of end of year total assets of a firm (Firm Sie= log(at)).

Independent Total independent directors at a board, divided by the board size. Source: BoardEx.

Leverage is the ratio of long-term debt plus debt in current liabilities, divided by the numerator plus market equity. (Leverage=(dlc + dltt)/(dlc + dltt+(prcc_c*csho))))

LinkedD_pct Fraction of independent directors appointed at a board that are also members or serve at the board of a nonprofit organization at the same time they serve at the corporate board. This is computed as the count of independent directors with links to a NPO divided by the total number of independent directors at a board in a certain year.

New_Link_App is the count of independent directors appointed that have a connection to a NPO.

Return is the log of the end of year stock one year return.

ROA is the log of net income plus interest expense (if available) divided by the total assets at the beginning of the year (ROA=log[(ni+tie)/at[t-1]]).

Salary is SALARY as defined in ExecuComp. Dollar value of the base salary earned by the named executive officer during the fiscal year.

Stock measured as log(1+ RSTKGRNT) if available or log(1+STOCK_AWARDS_FV) otherwise.

Tobin's Q is the log of total assets plus market equity minus book equity, divided by total assets (Q= log(1+(at + (prcc_c - bkvlps)*csho)/at).

Total Pay is TDC1 as defined in ExecuComp. Total Compensation (Salary + Bonus + Other Annual + Restriced Stock Grants + LTIP Payouts + All Other + Value of Option Grants). Measured in thousands.

Options is log(1+OPTION_AWARDS_BLK_VALUE) as defined in ExecuComp.

4

CEO Risk Taking Incentives and Bank Failure during the 2007-2010 Financial Crisis

Since the inception of the latest financial crisis, bankers' compensation and the risk-taking incentives that compensation may have induced have become the focus of both regulatory and academic attention. This attention has led to the formulation of many compensation reform proposals, the implementation of some of them, and to a heated debate about the need for and the appropriate form of regulation of bankers' pay.[1] In this paper, we contribute to this debate by studying the relation between the risk taking incentives created by the compensation of the CEOs of large U.S. financial institutions and the probability of failure of these institutions during the financial crisis. We also analyze whether CEOs' risk taking incentives are the result of certain compensation vehicles as well as the factors that may have determined those incentives. In particular, we investigate whether CEOs' incentives are aligned with those of shareholders or whether they are the result of corporate governance failures at large US banks.

Analyzing the relation between managerial incentives and risk taking requires addressing two measurement challenges: how to measure bank risk and how to measure risk taking incentives. Although there are very different approaches to measuring bank risk, most share one or both of the following limitations. First, many measures have a limited ability to capture certain risks, particularly tail risk. For example, measures such as the commonly used z-score or the volatility of equity returns are unlikely to capture this kind of risk, especially if they are computed prior to crisis. Second, many measures (especially those that infer bank risk from the market value of securities) capture the part of firm risk that is borne by investors, but not the total amount of risk. This distinction is likely to be important for large financial institutions, since bank supervisors may (and do, as manifested during the financial crisis) intervene to prevent the default of systemically relevant institutions. The possibility of bank bailouts, thus, implies that measures of bank risk based on security prices may underestimate bank risk. More importantly, if different banks have different probabilities of being bailed out in the event of likely insolvency, differences in market risk measures may not reflect corresponding differences in the risk of banks' assets. To clarify this point, suppose that bank A would be bailed out for sure in case of distress, whereas bank B would never be bailed out. Bank A could take on greater risk (and, in fact, would have the incentive to do so) than bank B, yet market based measures of the banks' probability of default could show bank B as being riskier. To address these limitations of

[1] Section 956 of the 2010 Dodd-Frank Act requires that the banking agencies regulate compensation arrangements at large financial institutions to discourage inappropriate risk taking. In 2011, the different supervisory agencies issued a proposed rule to regulate pay in covered institutions. Outside of the US, regulatory action has been intense as well. For example, in Europe, the Committee of European Banking Supervisors issued in 2010 a set of *Guidelines on Remuneration Policies and Practices*, the European Union approved directives CRD III (in 2010) and CRD IV (in 2013) to regulate compensation at financial institutions, and, in the UK, the Financial Services Authority issued in 2009, and amended in 2010, the so called Remuneration Code. At the multinational level, the Financial Stability Forum issued the *Principles for Sound Compensation Practices* in 2009.

existing risk measures, we use bank failure during the 2007-2010 financial crisis as en ex post measure of risk taking in the run-up to the financial crisis. Because of the possibility (realized during the financial crisis) that bank supervisors or the government may intervene to prevent outright default of systemically important financial institutions, our definition of bank failure includes not only bank closures but also acquisitions of distressed banks with the assistance or under the influence of supervisors or the government. As a case in point, Bear Sterns did not technically fail, yet it was acquired by JPMorgan with the intervention and assistance of the Federal Reserve for $10 per share, when the previous closing price was $30 and when just two weeks earlier the stock had traded at $85.88.

Regarding the challenge of measuring CEOs' risk taking incentives, in recent years the empirical analysis of managerial incentives has focused on the incentives generated by managers' holdings of stock options. The convexity of a call option's payoff profile implies that its Black-Scholes value is increasing in the volatility of the underlying stock. Therefore, since Guay (1999) proposed the measure, several papers (notably Coles et al. (2006)) have used the sensitivity of the Black-Scholes value of a CEO's holdings of stock options to the volatility of the firm's stock as a measure of the CEO's risk taking incentives. In particular, Fahlenbrach and Stulz (2011) use this measure of risk taking incentives (which we label in this paper *option vega* or OV) and find that it has no significant relation with bank risk in a sample of large U.S. banks. However, because of limited liability, the payoff of the stock of a levered firm is also a convex function of the value of the firm's assets. As argued by Black and Scholes (1973) and Merton (1973), equity can be understood as a call option on the firm's assets, so that equity value is increasing in the volatility of the firm's assets. Therefore, in levered firms, the CEO's holdings of company stock may provide incentives for risk taking. To capture these incentives, Chesney et al. (2012) propose a measure of the sensitivity of the value of CEOs' equity holdings to the volatility of the firm's assets (which they label *Asset Volatility Vega*, or AVV) and show that this sensitivity is large for the CEOs of large U.S. financial institutions.[2] In this paper, we use Chesney et al. (2012)'s measure as our baseline measure of incentives. However, option vega and AVV are highly nonlinear functions of their arguments, many of which are approximated somewhat crudely. Moreover, their ability to measure risk taking incentives hinges on the accuracy of the structural model used to estimate the option value. Therefore, both for ease of interpretation and to assess the robustness of our results, we also propose a simple reduced form measure of risk taking incentives (*Leveraged Delta*, or LD), which is just the product of a bank's leverage (which determines the sensitivity of the value of the firm stock to changes in asset volatility) and the sensitivity of the CEO's wealth to changes in the value of the firm stock (known as *Delta*). LD also constitutes a computationally simple alternative to measure risk taking incentives. Our estimates of AVV and LD for the year 2006 suggest that bank CEOs had strong incentives to take on risk. Moreover, there was substantial variation across financial institutions in the strength of those incentives.

We estimate the relation between risk taking incentives measured in year 2006 and bank failure in the period 2007-2010 for a sample of large US financial institutions. We find that, whereas there is no significant relation between bank failure and risk taking incentives measured as option vega (in line with the findings of Fahlenbrach and Stulz (2011)), there is a statistically and economically significant relation between AVV or LD and bank failure. Having documented such a relationship, we discuss and test several alternative explanations for it. Thus, we consider the possibilities that the relation is due to the correlation of our incentive measures with the strength of other unmeasured incentives (such as those stemming from the threat of replacement) or with firm or CEO characteristics potentially correlated with greater risk taking. We test

[2] Anderson and Core (2013) propose alternative measures of risk taking incentives that aim to capture the incentives embedded in options, equity, and debt-like claims held by CEOs, such as pension benefits and deferred compensation.

these explanations by using different proxies for the unmeasured incentives or firm or CEO characteristics. Our tests provide, at best, weak support for these explanations and show that the relationship between risk taking incentives and bank failure survives the inclusion of the different proxy variables. We also consider, and find no support for, the alternative that our risk taking measures are simply measuring risk and not risk taking incentives.

The possibility that the incentives created by CEOs' compensation arrangements may have been responsible for excessive levels of risk taking prior to the crisis has led to a variety of proposals for the regulation of bankers' pay. Some proposals aim at improving the quality of banks' governance, under the assumption that the excessive risk taking incentives were the consequence of faulty monitoring by boards or shareholders.[3] Other proposals involve limitations in pay levels or the use of certain compensation vehicles, such as stock options or termination payments (severance pay or golden parachutes).[4] To investigate the sources of risk taking incentives and the potential impact of the different proposed forms of regulation, we analyze whether risk taking incentives are associated with the quality of corporate governance or with the use of certain compensation vehicles. If we measure the quality of corporate governance using standard governance measures, which aim to capture managerial entrenchment or the severity of the agency problem between shareholders and managers (such as board size or independence, Gompers et al. (2003)'s *governance index*, or Bebchuk et al. (2009)'s *entrenchment index*), we find no significant relation between these measures and either bank failure or risk taking incentives. Therefore, our results do not lend support to the idea that improving shareholders' ability to monitor and discipline managers would have substantially affected bank risk. In contrast, we propose a measure of shareholders' incentives to take on risk (which we label, *shareholder asset volatility vega* or SAVV) and find that it has a very strong and positive correlation with our incentive measures. Therefore, our results suggest that, if anything, CEOs' risk taking incentives were too well aligned with those of shareholders.

Regarding the relation between compensation structure, risk taking incentives, and bank risk we do find that risk taking incentives are related to the level of total pay, yet we fail to find any significant relation between different measures of compensation structure, which capture the importance of equity or stock option compensation or the use of termination payments, and either incentives or bank failure. Thus, our findings indicate that limiting particular forms of compensation may not be the most effective way of curbing risk taking incentives.

In the wake of the financial crisis, several articles have analyzed the relation between the compensation of bank CEOs and risk taking.[5] Fahlenbrach and Stulz (2011) analyze the relation between the stock returns of a sample of large U.S. banks in the period from July 2007 to December 2008 and two measures of incentives computed in 2006: pay-performance sensitivity (*delta*) and option vega (which they label equity risk). They find that, whereas there is a negative relation between stock returns during the crisis and delta, there is no significant relation between stock returns and option vega. DeYoung et al. (2013) analyze the relation between both risk (measured as the standard deviation of returns, the stock's beta, or the stock's idiosyncratic risk) and business policies likely to be related to bank risk (such as noninterest income, commercial loans, or private MBS holdings) and one-year lagged CEO incentives (measured by delta and option vega). In contrast to Fahlenbrach and Stulz (2011), DeYoung et al. (2013) do find

[3]See, e.g., the SEC Chairman's speech at the Transatlantic Corporate Governance Dialogue 2009 Conference (Shapiro (Shapiro)).

[4]For example, firms receiving TARP funds were not allowed to pay golden parachutes and could not pay bonuses unless they had the form of restricted stock. Although caps on compensation initially proposed by the Treasury in February 2009 were later lifted, stringent limits on the tax deductibility of executive compensation were maintained. A starker example is the European Union's Capital Requirements Directive IV, which, among other things, establishes that the ratio of variable compensation to fixed compensation cannot be, generally, greater than one (and under no circumstances greater than two).

[5]There are few earlier studies of these relation, notably Houston and James (1995) and John and Qian (2003).

a relation between option vega and both bank risk and bank policies for a sample of U.S. commercial banks in the period from 1995 to 2006. Cheng et al. (2013) propose a simple principal-agent model that yields the result that inherent firm riskiness may be unrelated to CEOs' pay-performance sensitivity and, at the same time, positively related to excess CEO pay. They test empirically the model's predictions by analyzing the relation between lagged measures of risk (especially, the volatility of stock returns and the stock's beta), which aim to capture banks' inherent riskiness, managerial stock ownership and excess pay in a sample of large U.S. financial institutions. They find that whereas there is no significant relation between risk and managerial ownership, there exists a positive relation between risk and excess pay. They also find no significant relation between a series of governance variables (governance index, entrenchment index, board independence) and either pay or risk. In the paper most closely related to ours, Chesney et al. (2012) propose AVV as a measure of risk taking incentives for levered firms and, for a sample of large U.S. banks, find evidence generally consistent with a positive relation between AVV in the year prior to the crisis and bank write-downs (which they use as an ex post measure of risk) during the crisis. They also fail to find any significant relation between governance variables and write downs. Gande and Kalpathy (2012) use a form of government assistance to banks (the extent of U.S. Federal Reserve emergency loans provided to banks) as an ex post measure of bank risk. In their sample, option vega before the crisis is positively associated with the extent of Federal assistance. John et al. (2010) study the relation between the pay-performance sensitivity of bank CEOs, leverage, and several measures of outside monitoring and find that pay-performance sensitivity is positively associated with outside monitoring and negatively associated with bank leverage. Finally, Bebchuk and Spamann (2010) and Bebchuk et al. (2010) analyze case studies of executive compensation at large U.S. financial institutions and propose compensation reforms.[6]

Our article contributes to the rapidly growing literature analyzing executive compensation and risk taking in banks in several ways. First, we propose an ex post measure of bank risk, bank failure during the crisis, that aims to capture the full extent of bank risk taking prior to the crisis. Second, we use measures of risk taking incentives (both Chesney et al. (2012)'s AVV and the reduced form LD, which we propose here) that better capture the risk taking incentives generated by CEOs' portfolios of stock and stock options. Third, we propose a measure of shareholder incentives to take on risk and analyze its relation with CEO risk taking incentives. Finally, we investigate whether risk taking incentives can be attributed to particular compensation practices, such as the use of termination incentives, or compensation structures, an issue that is relevant for the potential regulation of the compensation of bank executives.

4.1 Sample selection

To select our sample of financial institutions, we first select all firms with 4-digit SIC codes between 6000 and 6300 covered by the compensation database Execucomp and whose CEO is identified in this database in year 2006. Of the 167 firms so selected, we keep all firms with SIC codes 6020 (*Commercial Banks*), 6035 (*Savings Institutions, Federally Chartered*), and 6036 (*Savings Institutions, Not Federally Chartered*)—a total of 114 firms—and we exclude firms with SIC codes 6111 (*Federal Credit Agencies*) and 6282 (*Investment Advice*). To determine the inclusion of the 41 firms in the remaining SIC codes, we search the National Information Center of the Federal Financial Institutions Examination Council (FFIEC) to verify each firm's

[6] Laeven and Levine (2009) and Erkens et al. (2012) also analyze the relation between bank governance and bank risk for international samples of large financial institutions.

institution type in year 2006.[7] We keep a firm in the sample firm if it is identified as any type of regulated institution.[8] We also keep in the sample those firms listed as primary dealers by the New York FED.[9] This process yields a base sample of 130 firms in 2006, from which we drop five firms because there is not enough information about them for the analysis.[10] Therefore, our final sample has 125 firms. However, for some firms there is not enough information to compute all variables of interest, so the final number of firms that we use in the analysis depends on the data requirements of each specification. For transparency, in Table 4.1 we report our final sample.[11] In Section 4.8, we also check the robustness of our results to different sample selection criteria.

Since we obtain compensation data from Execucomp, our sample is composed of relatively large publicly traded financial institutions. The sample contains all large bank and financial holding companies whose main activity is commercial banking, from banks with national presence (such as Bank of America or Wells Fargo) to regional banks (Fifth Third Bancorp., National City Corp. or Regions Financial Corp.) or banks operating mainly in one or two states (such as Anchor Bancorp Wisconsin Inc. or Tompkins Financial Corp.). The sample also contains the five large investment banks (Bear Sterns, Goldman Sachs, Lehman Brothers, Merrill Lynch, and Morgan Stanley) and several holding companies (such as American Express Co. and Charles Schwab) that have bank subsidiaries and are federally regulated.

We obtain accounting information from Compustat Fundamentals. Panel A in Table 4.3 displays several summary statistics of the firms in our sample, whereas Panel B displays the same statistics for the universe of firms in Compustat with SIC codes between 6000 and 6050. If one compares the two tables, one can indeed observe that the financial institutions in our sample are significantly larger, irrespectively of whether size is measured by market capitalization or total assets. In our sample, the average market capitalization is \$466 billion (median \$36.7 billion) and the average total asset value is \$106.8 billion (median \$11.2 billion). The same values in the Compustat universe of banks are \$113.2 billion (median \$2.2 billion) and \$41.4 billion (median \$1 billion), respectively. The financial institutions in the sample appear as well to have a lower leverage and higher ROA than the Compustat universe of banks.

4.2 Risk and bank failure

Our measure of risk taking in the years preceding the crisis is the occurrence of bank failure during the crisis period. Because of the potentially systemic importance of many of the banks in our sample, regulators may be expected to intervene to bail out a bank at risk of insolvency or to encourage sound banks to acquire the financially distressed banks so as to avoid actual

[7] These firms have SIC codes: 6099 (*Functions Rel. To Dep. Bkg.*), 6141 (*Personal Credit Institutions*), 6153 (*Short-Term Business Credit*), 6159 (*Misc Business Credit Instn*), 6162 (*Mortgage Bankers & Loan Corr*), 6172 (*Finance Lessors*), 6199 (*Finance Services*), 6200 (*Security & Commodity Brokers*), 6211 (*Security Brokers & Dealers*). We access the National Information Center of the FFIEC at `http://www.ffiec.gov/nicpubweb/nicweb/SearchForm.aspx`.

[8] The classes of regulated institutions are: financial holding company, bank holding company, savings and loans holding company, federal savings bank, national bank, state member bank, FDIC-insured non-member bank, federal savings association.

[9] `http://www.newyorkfed.org/newsevents/news/markets/2006/an060915p.html`

[10] We drop Center Financial Corp., with SIC 6036, because it does not match with *Compustat Fundamentals*. We drop Raymond James Financial Corp., Bankunited Financial Corp., Glacier Bancorp Inc., and Guaranty Financial Group Inc. because there is not enough information to compute our measures of risk taking incentives.

[11] Our sample selection procedure is like the one employed by Fahlenbrach and Stulz (2011) except that we exclude Federal Credit Agencies, so, for example, Fannie Mae is not in our sample.

default. Identifying bank failure with default would, thus, not pick up the instances of financial distress in which the regulators' intervention averts bank failure. Therefore, even in the midst of a financial crisis, outright default of large financial institutions may be too rare (and it is indeed rare in the 2007-2010 period) to allow for a precise estimation of the coefficients of interest. Moreover, using default as a measure of failure could bias the estimates if different banks have different probabilities of being bailed out. In particular, the CEOs of those banks more likely to be bailed out if they are at risk of insolvency may take on greater risk in the anticipation of a bailout. If regulators would not allow these banks to default, one would incorrectly attribute a low level of risk taking to banks with a large risk exposure. Therefore, we define bank failure so as to encompass both institutions that default and those that are acquired by other financial institutions with the support or intervention of regulators.

We define as *failed* a financial institution that ceases operations as an individual entity during the financial crisis because of financial distress. To date the crisis, we follow the time-lines provided by the New York Fed (which dates the beginning of the "financial turmoil" in June 2007, when Bear Stearns pledged $3.2 billion to aid one of its hedge funds)[12] and the Saint Louis Fed (which dates the beginning of the financial crisis in February 2007, coinciding with Freddie Mac's announcement that it would no longer buy the riskiest subprime mortgages and mortgage-related securities)[13] and define 2007 to be the first year of the financial crisis.

To determine the firms that cease operations we first identify which firms are delisted in the period 2007-2010 by analyzing the series of monthly returns in the CRSP stock database.[14] This process yields a set of 33 delisted firms. However, firms may delist for reasons other than bankruptcy or financial distress. For example, firms may go private, merge, or be acquired for strategic reasons even if they are sound. To determine whether firms were delisted because of financial distress, we take the following steps:

1. We check the FDIC webpage for information about banks that become inactive during the crisis period.[15] However, the FDIC provides information about active and inactive banks but not holding companies (which are our unit of observation). Therefore, we first identify the main banking subsidiary of each holding company from the organization's structure provided by the FFIEC. The FDIC indicates if a bank is inactive because it was put into receivership, or because it was merged (with or without financial assistance by the regulator). If the FDIC indicates that the firm was closed or there was a merger with financial assistance by the FED or the FDIC we consider the firm failed. We unambiguously identify 9 firms as failed in this step.

2. *Merger discount.* Following the procedure used by Fahlenbrach et al. (2012), we use the SDC Platinum database to identify mergers and check whether firms not classified as failed in the previous steps are acquired with a discount in the crisis period. In particular, we identify three firms acquired with significant discounts (with 1-day, 1-week and 1-month negative premiums of above 30%). We also consider as failed a firm (Mellon) acquired with a one-day small discount of 6% as well as a firm (Countrywide) that is actually acquired with a 1-day positive premium of 40%, but with 1-week and 1-month discounts of 18 and 28%, respectively.

3. For those delisted firms that we do not classify as failed in the previous steps, we search the PROQUEST database using the company name and the following words as keywords:

[12] `http://www.ny.frb.org/research/global_economy/Crisis_Timeline.pdf` (last accessed on October 17, 2013).

[13] `http://timeline.stlouisfed.org/index.cfm?p=timeline` (last accessed on October 17, 2013).

[14] More precisely, we merge the sample with CRSP monthly stock returns and we identify the last available month of returns provided for each PERMCO.

[15] `http://www2.fdic.gov/idasp/main.asp`.

failed, bankrupt, intervened, closed. The PROQUEST search identifies one firm as failed (Lehman Brothers).

4. We finally perform the same search on the internet (using standard search engines). This broader internet search indicates that one firm is acquired with substantial regulatory pressure (Merrill Lynch), another one with TARP aid given to the acquiring institution (National City Corp), and another one after a large amount of TARP bailout money is given to the target institution (Provident Bankshares).[16]

The procedure identifies 21 firms in the sample as failed, but we delete two of these firms (Bankunited Financial Corp. and Guaranty Financial Group Inc.) from the sample because we do not have enough data about them to estimate risk taking incentives. Therefore, the final number of failed firms is 19. For transparency, we provide the list of failed firms as well as the reason why they are identified as such in Table 4.2. Since the last three steps involve some judgment on our part, in Section 4.8 we consider the robustness of our results to alternative classifications of the borderline cases.

Panel C in Table 4.3 displays the characteristics (measured in 2006) of failed and surviving banks. The most significant difference between failed and surviving banks is their leverage: In 2006, the banks that eventually failed during the crisis had a leverage about 40% larger than that of the banks that would survive the crisis. Failed banks are also larger on average than surviving banks, but the difference in means is not statistically significant at conventional levels (although a non-parametric test of the difference in medians rejects the null of equality of medians at the 10% level).[17] Although failed banks had a higher average ROA in 2006, one cannot reject the hypothesis that the two groups of banks came from populations with the same median.

As discussed in the introduction, using bank failure as a measure of risk helps us avoid some of the key limitations of alternative risk measures. However, bank failure is not without problems. First, as an ex post measure of realized risk, bank failure likely contains a significant amount of measurement error: Whether a bank fails is determined not only by ex ante decisions that determine the level of risk, but also by luck. This measurement error will push up the standard error of our estimates. Second, our measure of bank risk captures the exposure to risks that have negative realizations during the financial crisis. It is possible that those banks more likely to fail conditionally on the events that led to the financial crisis were not riskier ex ante. Third, with our definition of failure we capture instances in which a firm's financial condition is so weak that it is forced to disappear as an independent entity (either because of bankruptcy or forced merger). However, we may consider as healthy systemically important financial institutions that managed to survive only thanks to massive public aid (such as Citigroup or Bank of America). Since this misclassification may bias our results, in Section 4.8 we evaluate the robustness of the results to classifying as failed (or excluding from the sample) some institutions that survived as separate entities only because they receive extremely large amounts of public funding. Finally,

[16]In the case of Merrill Lynch, there were sustained rumors that the Federal Reserve had pressured Bank of America to carry out the acquisition and Congressional hearings were held in 2009 to determine, among other things, whether the Government or the Federal Reserve had pressured or threatened Bank of America's management to acquire Merrill Lynch (see, e.g., Story and Becker (2009)). National City Corp was acquired after being one of the few qualified banks that was denied TARP help. On the contrary, the acquirer (PNC) received TARP money a few weeks before the purchase of National City was announced. We interpret this as a passive way of regulators to support the acquisition of National City by PNC Financial. Finally, Provident Bankshares Corp received $151,500,000 from TARP to prop up capital on Nov. 14, 2008. One month later the purchase by M&T was announced.

[17]Throughout the article, we define size in terms of total assets. Defining size in terms of market capitalization does not alter the results. Similarly, we follow Fahlenbrach et al. (2012) and define leverage as the quasi-market value of leverage, computed as the ratio of book value of assets minus book value of equity plus market value of equity divided by market value of equity.

as a binary variable, our measure is coarse, since it makes no distinctions within the groups of failed or surviving banks.

4.3 Risk taking incentives measures

Executive stock options are call options on the firm's stock. Since the value of a call option increases with the volatility of the underlying stock, the most common measure of risk taking incentives in the recent literature on executive compensation is the *option vega* of the executive's wealth (Guay, 1999). The option vega approximates the change in a CEO's wealth that would follow from a 0.01 change in the volatility of the returns of the stock of the CEO's firm. In the baseline case in which the CEO holds n_O identical options, the CEO's option vega ν_O is:

$$\nu_O = n_O \frac{dOV}{d\sigma_S} 0.01, \tag{4.1}$$

where OV is the option's value and σ_S the volatility of the stock's returns. In applications, OV is computed as the Black-Scholes value of the option adjusted by dividends (Black and Scholes, 1973; Merton, 1973). If the CEO holds different option grants, then:

$$\nu_O = \sum_i n_{O,i} \frac{dOV_i}{d\sigma_S} 0.01, \tag{4.2}$$

where the index i identifies each option grant.

However, because of limited liability, the equity value of a levered firm also increases with the volatility of stock returns. In fact, equity can be understood as a call option on the firm's assets (Black and Scholes, 1973; Merton, 1973), so that equity value is increasing in the volatility of the firm's assets. Guay (1999) proposes a method to estimate the derivative of equity value with respect to the volatility of stock returns ($\frac{dS}{d\sigma_S}$). With this method, he estimates the sensitivity of CEO's stock portfolio to the volatility of stock returns for a sample of US CEOs in 1993 and finds that it is generally very small, corresponding to a generally small leverage in his sample.[18] Therefore, most papers analyzing CEOs' risk taking incentives measure these incentives simply by means of option vega (e.g., Coles et al. (2006)). Using this measure of risk taking incentives, Fahlenbrach and Stulz (2011) find that there is no statistically significant relation between risk taking incentives and bank risk (measured by banks' buy-and-hold returns during the financial crisis). However, banks are highly levered institutions. Therefore, whereas approximating risk taking incentives with option vega may be appropriate for samples of healthy non-financial institutions, it is an open question whether the approximation is valid for financial institutions.[19]

Chesney et al. (2012) propose a measure of CEO risk taking incentives that incorporates explicitly the sensitivity of equity value to firm risk (for an alternative measure, see Anderson and Core, 2013). In the baseline case in which the CEO holds identical options, their measure of risk taking incentives (which they label Asset Volatility Vega or AVV) is:

$$AVV = n_O \frac{dOV}{d\sigma_v} 0.01 + n_S \frac{dS}{d\sigma_v} 0.01, \tag{4.3}$$

[18] The median sensitivity estimated by Guay (1999) is very small. However, Guay reports that it is substantial for a small number of CEOs.

[19] It is worth noting that, as discussed by Chesney et al. (2012), the Black-Scholes option vega may also be a poor approximation to a firm's option vega if the firm is highly levered.

where the derivatives are with respect to the volatility of firm value, σ_v (and not of stock returns). Chesney et al. (2012) estimate both this measure and option vega for a sample of US bank CEOs and find that option vega is substantial (the average ν_O is \$301,000) and larger than the one estimated in other studies for CEOs of non-financial firms. However, average AVV is ten times larger and the correlation between the two incentive measures is far from 1. Chesney et al.'s results thus suggest that the risk incentives measured by AVV are distinct (and stronger, in the case of bank CEOs) from those measured by option vega. In this paper, we follow Chesney et al. (2012) and use AVV as a measure of incentives. In Appendix 4.10.1, we summarize how we compute AVV, but we refer to the article by Chesney et al. (2012) for the details.

Measures such as option vega or AVV have the advantage (with respect to model-free measures such as, for example, the proportion of stock options in the CEO's portfolio) that they have a clear economic interpretation. However, the value of these measures may be highly dependent on the accuracy of the valuation model used to compute the derivatives as well as of the numerous approximations that are made when estimating the model's parameters. In this respect, the record of contingent claims models, such as the one used to compute AVV, to value corporate liabilities or predict financial distress is mixed at best (see, e.g., Bharath and Shumway (2008) or Campbell et al. (2011)). The problem is, arguably, more acute when these models are applied to the valuation of executive stock options, because some of the models' key assumptions—notably the ability to hedge the option—do not hold if applied to obtain the value of employee stock options for undiversified executives (Lambert et al. (1991), Carpenter (2000), Hall and Murphy (2002), Ingersoll (2006)). Moreover, the incentive measures are highly nonlinear functions of the parameters, making interpretation complicated in the presence of model misspecification. Therefore, to help interpret our results we also compute a simple reduced-form measure of risk taking incentives, which we label *leveraged-delta* (LD) and define as:

$$LD = \Delta \times leverage, \tag{4.4}$$

where Δ is defined, as it is the norm in the literature on executive compensation, as the approximate change in CEO wealth associated with a 1% change in the stock price.[20] Our definition of LD aims to capture that, on the one hand, the increase in equity value generated by an increase in firm volatility can be expected to be increasing in the firm's leverage. On the other hand, the value to an executive of an increase in equity value will be increasing in the executive's exposure to the firm's equity (as measured by Δ). Since LD cannot be interpreted meaningfully as a change in the CEO's wealth, for ease of interpretation we normalize it by dividing it over the sample standard deviation. Thus, one can interpret regression coefficients on LD as the impact of a change of one standard deviation in LD.

It is important to note that because of the assumptions made to compute AVV and because of the nature of LD as a simple yet crude approximation to the potential benefits stemming from increasing firm risk, both measures are likely to be quite noisy approximations to the true risk taking incentives implied by CEOs holdings of their firm's equity. Therefore, even if the measurement error is unrelated to the underlying incentives, the coefficients on the risk taking incentives measures will tend to be biased towards zero because of the attenuation bias due to measurement error. There may also be additional unmeasured sources of risk taking incentives, such as those stemming from CEOs' holdings of other financial assets (which may allow them to hedge the risk of their holdings of the firm's stock or options), dynamic incentives stemming from the relation between bank performance and future compensation, or, importantly, incentives generated by the threat of replacement, which we discuss further in Section 4.5.

[20] As it is usual in the executive compensation literature, we measure the sensitivity of option value to a change in the stock price as the derivative of the Black-Scholes value of the option with respect to the stock's price times a 1% change in the stock price (see the appendix). We note that, as a result of applying the standard Black and Scholes' model to obtain the delta of stock options, the LD measure is not fully "model-free."

Before analyzing the relation between risk taking incentives and bank failure, it is important to evaluate the strength of those incentives and whether there is substantial variation in incentive strength among the financial institutions in the sample. Panel A in Table 4.4 provides descriptive statistics of the incentive measures measured in year 2006.[21] The incentives to take risk as measured by option vega are substantial: a 0.01 change in the standard deviation of bank stock returns leads, on average, to an increase of $323,192 in CEO wealth (about 5% of the average total pay).[22] However, the strength of incentives as measured by AVV is much greater: a 0.01 change in the standard deviation of bank asset returns leads, on average, to an increase of $2.65 million in CEO wealth (about 40% of the average yearly total pay).[23] The incentive measures also display substantial dispersion, with standard deviations at least twice as large as the mean. A 0.01 change in the standard deviation of bank asset returns would increase the wealth of the CEO at the 10th percentile of the distribution of AVV by a mere $19,200. The same change in asset return volatility would increase the wealth of the CEO at the 90th percentile of the distribution of AVV by $5.2 million. The distribution of the incentive measures also exhibits right skewness, with a lower bound at zero, some very high values, and with means substantially higher than the median.

Although the magnitude of option vega is much smaller than that of AVV, if the two variables were highly positively correlated we might expect a similar impact on the probability of bank failure. However, we show in Panel B of Table 4.4 that the correlation between vega and AVV is just 0.16 and the correlation between option vega and LD is 0.26. Therefore, whereas there is a positive correlation between option vega and our incentive measures, they exhibit different distributions. At the same time, we would be concerned if AVV and LD exhibited a low correlation. On the contrary, Table 4.4 shows that the simple correlation coefficient between these two variables is 0.84, which strengthens our confidence that the two variables are meaningful measures of risk taking incentives.

In Table 4.4 we also report summary statistics for delta, which is commonly used as a measure of the CEO's incentives to increase shareholder value and which, as we discuss in Section 4.5, has also been used to account for risk taking incentives. Delta has a positive correlation with all the risk taking incentives measures and a very strong one with LD, which indicates that the variation of the latter measure is not due mainly to differences in leverage.

[21] We note that we compute the incentive measures differently for seven firms because of data availability or management changes. In three firms (First Niagara, Goldman Sachs, and UnionBanCal Corporation), the CEO retires in 2006. Since retirement years are highly atypical, for these firms we compute the incentive measures in year 2005. Starting December 15, 2006, SEC disclosure rules require firms to report disaggregated information of option grants awarded to CEOs. This disaggregated information allows us to compute the risk incentive measures directly as described in the Appendix. However, a few firms in our sample had an earlier fiscal year end, so that they did not have to comply with the new disclosure requirement until the next fiscal year (2007). For such firms (Bear Stearns, Goldman Sachs, Lehman Brothers, Morgan Stanley, and Washington Federal Savings) we use the one year approximation technique described in Core and Guay (2002).

[22] Total pay includes salary, cash bonuses, the value of stock and option grants, and the value of other compensation, such as pension contributions.

[23] We note that the distributions of option vega and AVV are very similar to the ones reported by Chesney et al. (2012) and Fahlenbrach and Stulz (2011) (the latter only compute option vega).

4.4 Risk taking incentives and failure

4.4.1 Empirical strategy

We seek to estimate the relation between risk taking incentives and bank failure during the financial crisis. Whereas, as described in Section 4.2, we follow the Fed in dating the financial crisis, a key element in our empirical strategy is the choice of the period in which we measure incentives. This choice is determined by several requirements. We require the period to be sufficiently close to the crisis to be able to potentially attribute to the compensation incentives in the measurement period an impact over the probability of failure during the crisis. Choosing a year such as 2000 would not satisfy this requirement. We also require that the incentive measurement period not be a crisis year for two reasons. First, to the extent that bank failure was motivated to a large extent by actions taken by banks in the years prior to the crisis, the measurement of incentives would take place after the actions they were supposed to incentivize. Second, we want to avoid reverse causality: Measuring incentives during the crisis would capture the reaction of CEOs' compensation packages to negative realizations of uncertainty during the crisis. To meet the above criteria and maximize the availability, quality, and intertemporal comparability of the data, we measure incentives in year 2006, after the passage of a new set of compensation disclosure requirements by the SEC.[24] Moreover, other studies have used 2006 as their measurement period (e.g., Fahlenbrach and Stulz (2011), Chesney et al. (2012)), which makes it easier to compare our results with theirs.

Although we have a panel with firm and compensation data, by construction we have only a single cross section of the dependent variable (failure). Therefore, our empirical specifications are cross section regressions with failure during the crisis as the dependent variable and incentives measured in 2006 as the explanatory variable of interest. We note that the use of bank failure during the financial crisis as the dependent variable rules out the use of fixed effect estimation to control for time-invariant unobserved heterogeneity among financial institutions.

Since we would like to capture the potential effect of risk taking incentives on the likelihood of failure, we cannot include as controls in our regressions measures of risk taking that could be the result of those incentives. To make this point clear, suppose that the credit risk of a bank's loan portfolio were the only variable determining bank risk. In this case, even if compensation fully determined CEOs' incentives to take risk (through the choice of riskiness of the loan portfolio), we would observe no effect of compensation on bank risk if we controlled for the credit risk of the loan portfolio in our regressions. In Section 4.5, we, nonetheless investigate the effect of including proxies for bank risk in the estimating equations. The small size of our sample significantly limits the power of the tests and further constrains our choice of control variables in the estimating equations. Thus, we include control variables only if there are a priori reasons to expect them to be related to both risk taking incentives and the probability of bank failure. In Section 4.5 we discuss our choice of regressors in the multivariate specifications. Here we emphasize that the goal of our analysis is not to accurately predict bank failure but to estimate the relation between pre-crisis incentives and bank failure during the crisis.

[24]Before 2006, the information on pension benefits and termination payments is very limited. The information provided regarding executive stock options also changes in 2006.

Our main specification throughout the paper is the linear probability model:

$$f_i = \alpha + \beta w_{i,2006} + \mathbf{x}_{i,t}\gamma + \varepsilon_i, \tag{4.5}$$

where w is the measure of risk taking incentives and $\mathbf{x}_{i,t}$ is a vector of controls measured in year t (to avoid reverse causality concerns, t is set to 2003 for some variables). Linear probability models have the advantage of easy interpretability, yet are necessarily misspecified because they do not restrict probabilities to lie between zero and one. The small size of our sample, however, makes estimation of nonlinear models (such as probit or logit models) highly imprecise.[25] Therefore, we focus on the results from linear probability models, although in Section 4.8 we also evaluate the robustness of our results to both non-linear transformations of the incentive measures and non-linear specifications of the estimating equation.

4.4.2 Univariate results

As a first step to measuring the relation between risk taking incentives and bank failure, we compare the means and medians of the incentive measures in the subsamples of failed and surviving financial institutions. The results, which we display in Panel C of Table 4.4, show that failed and surviving banks differ greatly in their risk taking incentives as measured by AVV and LD. Thus, the mean AVV (leveraged delta) among failed banks is about 8 times (almost 4 times) larger than among surviving banks and the difference is statistically significant at the 1% level. At the same time, although failed banks exhibit a higher option vega, the difference in mean option vega between failed and surviving banks is smaller and not statistically significant at the 10% significance level. We obtain similar results when we compare the medians of the two subsamples, which suggests that the difference between the subsamples is not driven by extreme values. Therefore, the comparison of the subsamples of failed and surviving banks shows that the measure of risk taking incentives matters: Whereas failed banks have substantially higher risk taking incentives as measured by AVV or LD, the difference is small and not statistically significant if measured by option vega.

In Table 4.5 we report estimated coefficients of the simple linear probability model (4.5), in which the dependent variable is a dummy variable that takes the value 1 if the bank failed during the crisis years and 0 otherwise and the single independent variable is a measure of risk taking incentives. The results show that a change of AVV of $1 million increases the probability of failure by about one percentage point and the estimated coefficient is statistically significant at the 1% level.[26] To better understand the magnitude of this estimated coefficient, a one standard deviation (10.38, see Table 4.3) increase in AVV would increase the probability of failure by 0.11 (11 percentage points). In turn, increasing AVV from its median to the 90th percentile would increase the probability of failure by 0.054. The results are very similar for LD, with an estimated coefficient that is statistically significant and of a similar magnitude than the one obtained for AVV: A one standard deviation change in LD is associated with about a 0.10 increase in the probability of failure. However, increasing leveraged delta from its median to the 90th percentile would increase the probability of failure by 0.09. Therefore, increases in risk taking incentives, when measured either by AVV or LD, are associated with a statistically and economically significant change in the probability of failure.

[25] The small sample size also recommends against alternative specifications such as duration models.

[26] Unless otherwise noted, all standard errors are robust. Using classical OLS standard errors does not diminish the statistical significance of the results.

If we measure incentives by means of option vega, however, the estimated coefficient is smaller (a one standard deviation change in option vega is associated with a 0.03 increase in the probability of failure) and not statistically significant at conventional significance levels. Therefore, with a different risk measure and a somewhat different sample, our results replicate those of Fahlenbrach and Stulz (2011), who find no statistically significant relation between option vega and bank risk taking. However, Fahlenbrach and Stulz (2011) do find a positive and statistically significant coefficient for delta. Given that there is a strong and positive correlation between delta and AVV, their results are not surprising in the light of ours and can be interpreted as capturing the risk incentives embedded in delta. We also estimate a positive coefficient for delta, bur it is not statistically significant at conventional significance levels. Therefore, it appears that it is the interaction of delta with leverage, not delta alone, what is is associated with bank failure. In Section 4.5 we further explore the role of delta in explaining our results.

Our univariate results are consistent with the existence of an effect of CEO compensation on bank risk. However, we do not have a source of exogenous variation in CEO compensation to identify such causal effect. Therefore, there are obviously alternative explanations for the results. In particular, risk taking incentives may be correlated with bank or CEO characteristics that either make banks inherently more risky or provide CEOs alternative incentives to take on risk. In the next section, we evaluate the plausibility of several possible explanations of the univariate results.

4.5 Alternative explanations

4.5.1 Other sources of incentives

In our sample, the risk taking incentives generated by CEOs' holdings of their company stock and stock options (as measured by AVV) are very strong. However, CEOs' motivation to take on risk may not be determined primarily by these incentives and the positive relation between our incentive measures and the probability of failure could be due to the correlation between these incentive measures and other, more relevant, determinants of bank risk or CEOs' risk taking choices.

First, the implicit incentives created by the threat of termination could be more powerful in determining CEOs' risk choices than concerns about the sensitivity of current wealth to firm risk. These implicit incentives will arise if banks pay CEOs more than their reservation value and bank risk affects the probability of termination (as in standard efficiency wage models). Whether the threat of termination provides incentives to increase or decrease risk will hinge on the determinants of CEO replacement. If CEOs are replaced only when firm performance is dismal, then the threat of termination may, in general, provide incentives to reduce risk, since CEOs will seek to lower the probability of negative tail risk (see, e.g., Espen Eckbo and Thorburn (2003)). On the other hand, if continuation as CEO requires being at the top of the distribution of performance among banks, then the threat of termination may provide incentives for taking on risk, since moderately poor performance would be as bad as extremely poor performance, whereas the CEO would benefit from very strong performance. In the former case, our results could be explained by the presence of weaker termination incentives in firms with higher AVV or LD; in the latter case, by a positive correlation between AVV or LD and termination incentives. In either case, if termination incentives dominated those provided by CEOs' equity portfolios, controlling for termination incentives would significantly reduce the estimated coefficient for AVV or LD. Unfortunately, measuring the sign of the effect of termination incentives on risk taking and the strength of these incentives at each firm in our sample is beyond the scope of this paper. However, termination incentives are, other things equal, likely to be stronger for CEOs with a higher total pay (to the extent that at least part of the pay premium reflects quasirents and not merely compensation for unobserved general skills that would also increase their reservation value), and for younger CEOs, since the number of periods in which these CEOs may earn rents if they are not replaced is higher. Therefore, including total pay and CEO age in the estimating equation is likely to capture in part the effect of termination incentives.

Golden parachutes (which are termination payments associated with a change in control of the firm, such as a takeover or a merger) or more general severance pay may also affect a CEO's termination incentives. Thus, other things equal, a CEO with generous termination payments will suffer less if replaced, which would increase his or her risk taking incentives by reducing the CEO's downside risk. Therefore, if termination payments were positively related to our incentive measures, they could explain our univariate results. Termination payments could also be set in place in firms at which there is an inherently higher risk of CEO replacement or a higher sensitivity of replacement decisions to firm performance. If either of these two factors is associated both with firms' inherent riskiness and with AVV or LD, this association could help explain our univariate results.

Second, CEOs may have incentives to take or hedge risks to affect the perception that shareholders of their firm or of other firms have of their ability, since this perception is likely to have a significant impact on their career prospects (DeMarzo and Duffie (1995), Breeden and Viswanathan (1998)). Again, the sign of the relation between the form or strength of these career concerns and CEOs incentives to take risk is not a priori clear. However, there are several variables that are likely to be correlated with a greater strength of those incentives. As in the case of termination incentives, the career concerns of older CEOs are likely to be muted because more information about their abilities has already accumulated and because there are fewer years left in which they may benefit from a higher perceived ability.

Third, our incentive measures may not capture other incentives generated by CEOs' equity and option portfolios. In particular, a CEO's delta may have an impact on risk taking even if the manager's compensation is linear in firm performance. On the one hand, as Coles et al. (2006) discuss, if there were a positive correlation between project risk and net present value, a higher delta, by increasing CEOs' incentives to invest in positive NPV projects, could lead managers to implement riskier projects. On the other hand, a higher delta implies that the manager's wealth depends more strongly on the firm's risky returns. A risk averse manager who cannot hedge this risk may, thus, respond to an increase in delta by reducing the volatility of firm returns. In the first case, our results could be explained by a positive correlation between delta and our measures of risk taking incentives. In the second case, by a negative correlation between delta and our incentive measures.

Finally, our risk taking incentives variables measure the incentives to take risk stemming from CEOs' equity portfolios. However, as recently emphasized by Sundaram and Yermack (2007), Edmans and Liu (2011), and Anderson and Core (2013), defined benefit pension plans and deferred compensation are similar to debt. Such debt-like assets make the CEO akin to a debtholder and, thus, provide incentives to take on (or limit) risk similar to those of debtholders. Again, our univariate results could be due to the fact that equity incentives are negatively correlated with debt-like incentives and the latter are the ones that truly motivate bank CEOs. Since pension benefits are usually benchmarked with total pay and typically increase with the tenure at the firm, we control for these incentives by including total pay and CEO tenure in the regressions.

4.5.2 Matching, risk, and compensation

Our univariate results could also be explained not by the correlation between our incentive measures and other unmeasured incentives, but by the fact that high AVV contracts are the least costly contracts to compensate the CEOs of inherently riskier firms or those CEOs who are more likely to engage in risky practices.

Standard principal-agent models provide one explanation of why there may be a relation between riskiness and incentives. In the standard models, in which the manager's action affects expected returns but not the volatility of returns, the performance sensitivity of pay should be, other things equal, negatively correlated with firm riskiness.[27] In this case, riskier firms would have lower deltas, which does not seem to be the case in our sample. However, the applicability of the results of the benchmark principal-agent model to bank CEOs is limited, since, among other things, bank CEOs are likely to be able to substantially affect firm risk, not just expected returns. Despite these potential limitations, Cheng et al. (2013) apply the standard model with the twist that firms that are inherently riskier (which would make a low sensitivity of pay to performance optimal) are also firms in which the marginal return of CEO effort is higher (which would make a high pay-performance sensitivity optimal). In their model, the CEOs of firms with different risk levels could, as a result, have similar similar pay-performance sensitivities. In turn, these similar pay-performance sensitivities would imply that the CEOs of riskier firms would be exposed to more risk. Since risk averse CEOs have to be compensated for bearing risk, total pay would have to be higher for the CEOs of riskier firms. According to this theory, there is a relation between compensation and firm risk, not because the former creates incentives for the latter (in fact, in their model, the CEO's actions do not affect firm risk) but because a firm's inherent riskiness determines the optimal CEO compensation. Cheng et al.'s model yields the prediction that, as long as the relation between riskiness and the marginal productivity of CEO effort is positive and strong enough, the CEOs of riskier firms will not have significantly lower deltas and, as result, will have both higher AVV and LD (if risk is related to bank leverage) and a higher total pay.

Alternatively, larger banks could be inherently risky (because of, say, their complexity) or more likely to engage in certain risky practices (because, for example, the existence of a too-big-to-fail implicit guarantee).[28] At the same time, a well known regularity in executive compensation is that CEO pay is increasing in firm size. To the extent that a larger total pay also implies a larger equity pay, firm size could be, somewhat mechanically, positively correlated with our risk taking measures. Controlling for pay in our regressions could control for the impact of size on risk through this channel. However, we would still like to include size as a regressor to control for potential effects of size on risk other than through total pay (and which could otherwise bias the coefficients of total pay or the incentive measures). As we discuss in Section 4.4.1, however, we do not want to include controls that may be themselves measures of bank riskiness. Since risky expansion policies in the years prior to the crisis may have influenced bank size as of 2006 (Fahlenbrach et al. (2012)), we measure firm size with a lag of three years.

Finally, rather than there being firms with different inherent risk levels, there may be CEO characteristics that determine CEOs' risk choices and different compensation contracts may attract

[27] See Prendergast (2002) for a discussion of the standard models and the empirical evidence.

[28] Of course, size could have the opposite effect of reducing the probability of failure, if larger banks had more skilled managers, if there were economies of scale in risk management, or if, despite the potentially perverse incentives they create, the net effect of too-big-to-fail guarantees on the probability of failure were negative. However, given the positive correlation between incentive measures and size, if the correlation between size and failure probability had a negative sign, then it would not explain our univariate results.

CEOs of different characteristics or be optimal given different risk-relevant CEO characteristics. We do not have a measure for CEOs unobserved risk aversion. However, we can control for variables that are likely to be correlated with CEOs risk perception or risk aversion. First, CEO age may be correlated with CEOs risk aversion, CEOs' estimates of the risk of different policies (for example, older CEOs may have lived previous crises, like the savings and loans crisis, in positions of responsibility),[29] or their degree of overconfidence. Similarly, if CEOs' risk aversion decreases with their wealth, a measure of CEOs' wealth may also allow us to partly control for differences in risk aversion. Therefore, we also control for CEO wealth (other than the wealth in the form of their own firm's equity) in our regressions.

4.5.3 Measures of risk taking incentives or of risk?

As we discuss in Section 4.3, the incentive measures we use will generally be positively related to firm leverage. At the same time, leverage may be interpreted as a measure of firm risk. Therefore, an alternative explanation of our results could be that the incentive measures are not measuring risk taking incentives but, instead, firm risk itself. In such a case, our results would just imply that the value of some nonlinear increasing function of firm risk is associated with a higher probability of failure.

To the extent that a higher risk of failure increases risk shifting incentives, distinguishing the effect of an exogenous increase in firm risk from the effect of the increase in risk generated by the stronger risk shifting incentives is not straightforward. However, as a crude way to evaluate the possibility that our incentive measures simply measure bank leverage, one can control for leverage in the regressions. If the relation between incentives and failure is due to the fact that the former are simply a proxy for leverage, then controlling for leverage should make the coefficients for incentives vanish. However, if the relation between leverage and the probability of failure is nonlinear, the incentive measures could still be capturing the nonlinear effect of leverage. To partly account for this possibility we also include leverage squared in the regressions. However, as we discuss in Section 4.4.1, if CEOs have the ability to determine leverage and leverage is an important determinant of risk, controlling for leverage could make the estimated coefficient of incentives vanish, even if risk taking incentives fully determined leverage and, thus, risk. The substantial correlation between leverage and incentives together with our small sample size may also render the estimates less precise.

4.5.4 Results

Before we describe the multivariate regression results, we present in Table 4.6 several summary statistics, as a way to evaluate the a priori plausibility of the different alternative explanations. Panel A in Table 4.6 shows that average total compensation for the CEOs in the sample is \$6.97 million (with a median value of \$2.2 million) and there is substantial heterogeneity in pay levels (with a standard deviation that is higher than the mean and with the CEO at the 90th percentile earning 30 times more than the CEO at the 10th percentile). At the same time, all incentive measures are positively correlated with total pay. Moreover, Panel B in Table 4.6 shows that failed banks also exhibit a higher average total pay (almost three times as large) than surviving ones. However, the difference in medians is negligible and the differences seem to be driven by

[29] See Malmendier and Nagel (2011) or Koudijs and Voth (2014).

the top payers among failed banks.[30] Therefore, total pay may be related to bank failure and, at the same time, is positively related to the incentive measures. Therefore, an explanation along the lines of the one proposed by Cheng et al. (2013) is a priori possible. If higher pay is associated with larger losses upon forced replacement, and if the threat of replacement provided stronger risk taking incentives, our results could also be explained by a positive correlation between risk taking incentives stemming from the threat of replacement and the measures of risk taking incentives. At the same time, Panel C in Table 4.6 shows that the correlation between total pay in 2006 and firm size in 2003 is 0.77, the correlations between firm size in 2003 and AVV and leveraged delta are, respectively, 0.32 and 0.41, and (as reported in Panel C of Table 4.3) failed banks are larger on average than surviving banks. Therefore, the explanation of our results based on the relation between size and total pay, on the one hand, and a mechanical relation between total pay and incentive measures, on the other, is also plausible.

Table 4.6 also shows that there is substantial variation in the use of termination payments. First, of the 118 firms for which we have the necessary information, only 64 have contractually determined severance pay and 81 have golden parachutes (although this does not mean that these firms may not pay the CEO in case of replacement, as shown by Yermack (2006).) For those firms with severance or golden parachutes, there is also significant variation in the value of the termination payments. At the same time, termination payments are positively correlated with the incentive measures and failed banks have higher termination payments (although the differences are not statistically significant). Thus, there is room for explaining our univariate results in terms of higher termination payments generating stronger risk taking incentives, or being associated with a higher exogenous firm risk.

As Table 4.4 shows, delta has a positive (and very strong in the case of LD) correlation with the risk taking incentive measures and seems to be higher in failed firms (although the difference in means is not statistically significant). Thus, if a higher delta reduced CEOs' incentives to take on risk, including delta in the regression specification would strengthen our univariate results. On the contrary, if a higher delta affected bank risk by providing CEOs stronger incentives to invest in positive NPV projects, including delta in the regression could help explain the univariate results.

CEO age is very weakly correlated with the incentive variables, and failed and surviving banks do not seem to differ significantly in the age of their CEOs. Thus, differences in career concerns or termination incentives stemming from differences in CEO age do not seem a likely candidate to explain our results. Similarly, tenure has a very weak correlation with the incentive variables. Further, total pay (which is likely to be positively correlated with the value of pension benefits) is positively correlated with both a higher probability of failure and with the incentive measures. Therefore, explanations of our results as stemming from the correlation between the incentive measures and the debt-like incentives faced by CEOs do not seem very plausible. On the other hand, even though CEOs' non-firm wealth is strongly and positively correlated with the incentive measures and is higher for the CEOs of failed banks (which could be associated with a smaller risk aversion for these CEOs), the latter difference is not statistically significant.

Finally, regarding the explanations of our results based on the role of our incentive measures as measures of risk, we find, as expected, that both AVV and LD have a strong positive correlation with leverage. Moreover, leverage is clearly higher for failed banks than for surviving banks. Therefore, this explanation deserves closer scrutiny.

In Table 4.7, we report the results of estimating our linear probability model including the different control variables discussed above. Including total pay reduces in about 25% the

[30] The 90th percentile bank among failed institutions pays more than two times the amount paid by the 90th percentile bank among surviving institutions.

magnitude of the estimated coefficients. Whereas the change does not affect the statistical significance of the AVV coefficient, the coefficient for LD is not statistically significant once total pay is included. At the same time, the coefficient of total pay is positive and not statistically significant when AVV is the incentive measure, and positive and marginally significant if the incentive measure is LD. Therefore, our results lend some support to explanations of the relation between the incentive measures and bank failure having to do with the need to compensate the CEOs of riskier firms for their risk exposure (such as the explanation proposed by Cheng et al. (2013)), or for the possibility that the threat of replacement may provide incentives for greater risk taking. Given the relatively large correlation between risk taking incentives and total pay, however, it is difficult to disentangle their effects with a sample the size of ours.

The effect of termination payments is ambiguous. Thus, although neither golden parachutes nor severance pay are significantly associated with failure when we do not control for total pay, they are statistically significant at conventional significance levels when all controls are included. However, their coefficients have opposite signs (with severance pay being positively and golden parachutes negatively associated with failure). These results could be explained by the possibility that golden parachutes are higher in firms that are more likely to be takeover targets. This larger probability of takeover, in turn, could provide incentives to CEOs to decrease risk to avoid very weak performance, which could trigger a takeover attempt. However, the relatively large correlations between termination incentives, the incentive variables, and total pay, together with our small sample size, recommend caution when interpreting the results. Including termination payments in the regressions has different effects depending on the incentive measure used. The coefficient for AVV increases sixfold when we include termination payments and remains highly statistically significant. In contrast, the point estimate of the coefficient for LD shrinks marginally and is measured less precisely, so that it loses its statistical significance.

The impact of the inclusion of delta depends on the incentive measure used. If we measure incentives by means of AVV, the coefficient for delta is negative, but small and not statistically significant, and its inclusion does not affect the magnitude or statistical significance of the coefficient for AVV. However, delta has a negative and both economically and statistically significant relation with the probability of failure if we measure risk taking incentives by means of LD. Further, including delta almost doubles the size of the LD coefficient, which remains highly statistically significant. Therefore, our results are consistent with a negative effect of delta on incentives in unlevered firms, and a positive and strong positive effect in highly levered firms, such as the banks in the sample.[31] Interestingly, if we include both delta and total pay as regressors, the coefficient for LD and delta remain similar in size and highly statistically significant, whereas the coefficient for total pay becomes smaller than the one reported in column 3 of panel B and loses its statistical significance.

The coefficients for the different CEO characteristics (age, tenure, non-firm wealth) are both small (point estimates imply that a one standard deviation change in each of the variables leads to changes in the probability of failure of around 0.02) and estimated very imprecisely, so that no coefficient is statistically significant at conventional significance levels. Moreover, neither the value nor the statistical significance of the coefficient of the incentive measure is affected by the inclusion of these additional controls. Therefore, either these variables are very noisy proxies of the variables of interest, or the factors they are proxying for do not play a first-order role in explaining our results.

In column 9 of Panels A and B in Table 4.7, we display the results of estimating a regression equation that includes the incentive measure, leverage, and leverage squared. The results show

[31] The estimated net effect of delta on the probability of failure is positive for all firms in our sample. We note that including leverage as a regressor, together with LD and delta, does not change the results: the coefficient for both delta (negative) and LD (positive) are statistically significant and of similar magnitude.

that the relation between the probability of failure and AVV and LD is not simply due to the positive correlation between these variables and leverage. Thus, either the relation between leverage and the probability of failure is nonlinear in a way that is captured both by AVV and LD, or the interaction between leverage and CEO compensation has a positive relation with risk beyond the direct impact of leverage on risk.

In summary, the multivariate regression results having to do with total pay provide, at best, weak support for the hypotheses that the threat of replacement provides incentives for risk taking and that riskier firms compensate their CEOs for the additional risk through a higher total pay. At the same time, controlling for variables that are likely to be correlated with riskier firms or less risk averse CEOs or with different strengths of other incentives does not explain away the association between incentive measures and bank failure. Further, this relation does not seem to be a mere artifact of their correlation with bank leverage. Our results are, thus, consistent with the existence of a causal effect of the risk taking incentives we measure on bank risk. However, we do not have a credible source of exogenous variation in incentives in our sample that would allow us to test this hypothesis. Therefore, there are at least two other explanations of our results. The first one is that firms differ in their inherent riskiness, that differences in riskiness are not captured by any of our controls, and that riskiness determines the optimal compensation contract in such a way that the optimal compensation contracts of riskier firms generate higher values of the incentive measures. The challenge with this explanation is to show that riskier firms would like to compensate their CEOs in a manner that would lead to higher values of AVV or LD. The second explanation is that our incentive measures are correlated with unmeasured incentives not captured by the variables we use to proxy for those incentives. Again, there remains the challenge to identify those incentives and explain why they are associated with the risk taking incentive measures. To partly address these challenges and to shed light on the determinants of risk taking incentives, in the next section we consider a set of explanations having to do with firm governance.

4.6 Bank governance

The quality of a bank's governance may determine the level and structure of CEO compensation. At the same time, the strength of bank governance may also determine the CEO's risk choices. In particular, governance failures are commonly cited as a main cause of the 2007-2010 financial crisis and a proposed alternative to limit bank risk is to improve the quality of the governance of financial firms. In this section, we investigate the impact of bank governance on risk taking and incentives.

According to managerial power theories of CEO pay, the CEOs of poorly governed banks are likely to be paid more. To the extent that higher pay is not accompanied by a change in compensation structure (in particular, with a reduction in the fraction of total pay that takes the form of equity), the CEOs of poorly governed firms will have larger equity holdings of their own firms and, thus, other things equal, stronger risk-taking incentives. Moreover, according to some managerial power theories of CEO pay poorly governed firms may structure CEO compensation so as to camouflage the level of that compensation (Bebchuk and Fried (2004)). In particular, poorly governed firms may make greater use of equity compensation, especially of stock option compensation, because these forms of compensation can be justified as providing incentives to the manager and because the cost to the firm of these compensation vehicles may have been easier to conceal or undervalue. Therefore, the risk taking incentives measures (which increase with the size of equity holdings and with the use of stock options) may be higher for the CEOs of poorly governed firms. At the same time, the CEOs of poorly governed banks may make riskier choices for reasons unrelated to the risk taking incentives captured by our incentive measures. For example, entrenched CEOs may be less likely to be replaced if the bank performs poorly. Therefore, these CEOs may not suffer much from downside risk and benefit as much as other CEOs from upside risk, which would make risky strategies more attractive for more entrenched CEOs. Worse governed firms may also have poorer risk management systems, which may allow for the excessive accumulation of risk.[32]

To investigate the impact of bank governance on the probability of bank failure, we consider several standard measures of the quality of corporate governance: board independence (measured as the percentage of directors who are independent); board size (since larger boards have been often described as less effective); the Governance Index (GI) of Gompers et al. (2003); and the Entrenchment Index (EI) of Bebchuk et al. (2009). The GIM governance index and the EI attempt to measure the degree of managerial entrenchment, with higher values of these variables denoting greater managerial entrenchment. We compute board independence and board size using information from RiskMetrics, BoardEx, and proxy statements. We obtain the GI index from Andrew Metrick's webpage,[33] and the EI index from Lucian Bebchuk's webpage.[34]

Table 4.8 displays summary statistics of the governance variables. The boards of the banks in the sample are relatively large (which is consistent with the size and complexity of the banks in the sample) and there is not a large heterogeneity in board independence. Otherwise, the levels and variation in the governance indices are similar to those reported in previous articles (Gompers et al. (2003), Bebchuk et al. (2009)).

We first check whether including standard governance measures in our regressions affects the size or sign of the coefficients of the incentive measures. As we report in Table 4.9, the coefficients of the incentive measures and their standard errors are largely unchanged with respect to the benchmark specification with only firm size as control. Moreover, the size and statistical significance of the coefficients of the governance variables are both small. Finally, the signs of the estimated coefficients for the standard governance variables have no obvious interpretation. For example, greater board independence is often argued to be a sign of good governance and a large board size is argued to lead to worse board performance. However, the coefficient for board independence is positive, indicating that greater board independence is associated with a higher probability of bank failure. At the same time, the coefficients for the GI and EI are of opposite signs. Therefore, standard measures of governance do not help explain the relation between incentives and risk.

Although the above results show that, controlling for compensation incentives, worse bank governance quality is not associated with a higher probability of failure, governance quality could be responsible for firms' risk choices if it determined the risk taking incentives embedded in CEO pay. To evaluate this possibility, we regress our measures of incentives on different governance variables. The results, reported in Table 4.9, show that only board size has a relation with the incentive measures that is marginally statistically significant. Therefore, overall, standard governance variables do not seem to be major determinants of risk taking incentives.

[32] We note that poor governance may also decrease firm risk. For example, less entrenched managers may need to achieve stelar performance to keep their job (which would increase risk incentives), whereas more powerful managers may be able to remain at their post with mediocre performance. To the extent that entrenched managers earn greater rents, they may also be less inclined to follow policies that increase the probability of default, since default (or regulator intervention to replace the management team) would imply the loss of those rents. In any case, what matters for the argument is that governance may be associated with firm risk through channels other than the incentives measured by AVV or leveraged delta.

[33] `http://faculty.som.yale.edu/andrewmetrick/data.html.`

[34] `http://www.law.harvard.edu/faculty/bebchuk/data.shtml.`

As a further check, in Table 4.9 we report the estimated coefficients of simple regressions with size and a governance measure as explanatory variables. The estimated coefficients are both small (implying changes in the probability of failure associated with a one standard deviation change in the governance variable of less than 3 percentage points) and not significantly different from zero in any case. Therefore, standard measures of the quality of corporate governance do not help explain either bank risk or CEOs' risk taking incentives. Our results are in line with the ones by Cheng et al. (2013) and Chesney et al. (2012), who find no discernible relation between governance variables and bank risk or incentives.

All the above governance variables are meant to measure the severity of the agency problem between shareholders and management. However, managers' incentives to take on risk may be determined, instead, by the incentives that shareholders themselves have to encourage risk taking. Because of a combination of limited liability, very high leverage, and implicit government guarantees, bank shareholders may have an incentive to take on risk at the expense of depositors and debtholders. As we discuss in Section 4.3, equity can be interpreted as a call option on the firm's assets. Therefore, in the same way that we measure the CEO's incentive to take on risk, shareholders' risk-shifting incentives may be measured by the shareholder returns from increasing firm risk. Thus, we define Shareholder Asset Volatility Vega ($SAVV$) as the return on the firm's stock associated with a 0.01 increase in the standard deviation of asset returns. Thus, we define SAVV as:

$$SAVV = \frac{1}{S}\frac{dS}{d\sigma_V}0.01. \tag{4.6}$$

Because of the possibility that SAVV may measure actual risk levels as of 2006 instead of risk-shifting incentives, we also measure it in 2003.

In stark contrast with the results regarding standard governance measures, the correlation between SAVV (measured in 2006 or 2003) and our incentive measures is essentially one (0.997 for SAVV measured in 2006, and 0.943 for SAVV measured in 2003). On the one hand, finding a positive correlation between AVV and SAVV may not be surprising given the definitions of the two variables. To see this, let $AVV_S = \frac{dS}{d\sigma_V}0.01$ and $AVV_O = \sum_i n_{Oi}\frac{dOV_i}{d\sigma_v}0.01$ (where i indexes the different option grants held by the CEO) be the AVV stemming from stock and option holdings, respectively. Then:

$$AVV = AVV_S + AVV_O = (S \times n_S \times SAVV) + AVV_O = (SV \times SAVV) + AVV_O, \tag{4.7}$$

where $SV = Sn_S$ is the value of the stock held by the CEO. Therefore, if the value of CEOs' equity holdings (SV) and AVV_O were unrelated to $SAVV$, then a positive correlation between AVV and SAVV would emerge.

However, there are theoretical reasons to expect that there should be a negative correlation between SAVV and both SV and AVV_O. If debt markets accurately reflected bank risk, excessive risk would be borne by shareholders through higher interest rates of the firm's debt (Jensen and Meckling (1976)). Therefore, it may be in the interest of those firms whose shareholders have stronger incentives to shift risk to debtholders to design the compensation of their managers so as to limit their incentives to take risk. It follows from this argument that the CEOs of more levered banks or, more generally, banks whose shareholders have a higher incentive to take on risk, will have lower pay-performance sensitivity (John and John (1993)), which can be achieved by ensuring that SV is low, and a smaller AVV_O. Therefore, if shareholders bore the costs of higher default risk, then one would not expect a strong and positive correlation between SAVV and AVV. However, because of deposit insurance, implicit government guarantees, or lack of sophistication by depositors, the interest rates on banks' debt and deposits may not reflect bank riskiness. In such case, those banks whose shareholders have greater incentives to take on risk may also provide stronger risk taking incentives to their CEOs. Table 4.8 shows that SAVV has a positive and substantial correlation with SV, delta, and AVV_O. Therefore, in our sample, shareholders with stronger risk taking incentives do not reduce the risk taking incentives of their CEOs by reducing their equity exposure or the risk sensitivity of their option portfolio.[35]

Our results are consistent with two alternative explanations. According to the first explanation, shareholders design compensation arrangements to align CEOs' risk taking incentives with their own or to compensate CEOs in the least costly manner given banks' inherent riskiness. Thus, if shareholders bear little of the cost of increased bank risk, then the shareholders of banks with higher SAVV would optimally give incentives to their CEOs to take on more risk. However, an alternative explanation is that CEOs' compensation arrangements are not optimally designed by shareholders and that, instead, the size and structure of compensation arrangements are largely orthogonal to firm riskiness or shareholders' incentives to take on risk. However, the characteristics of compensation packages may be such that, in general, they lead to higher measured incentives in riskier firms (irrespectively of whether the measured incentives capture actual incentives or just measures of inherent riskiness). To explore this possibility, as well as the impact of potential regulatory curbs on certain forms of compensation, we analyze next the characteristics of the compensation mix offered by the banks in our sample to their CEOs.

4.7 Compensation policies and risk taking

Firms' compensation policies may differ in terms of the compensation level or the compensation structure. We measure the compensation level by means of total pay, which encompasses salary, cash bonuses, the value of stock awards, restricted stock awards, and option awards, as well as other compensation components such as contributions to pension plans or disclosed perks. To describe the structure of CEOs' compensation packages, we define two ratios that seek to capture the relative use of different types of pay. We define a firm's *equity ratio* in year t as the total dollar value of stock and stock option grants in year t over total compensation in year t. Thus, equity pay reflects the relative importance of equity as a compensation vehicle (the part of compensation that is not equity consists mainly of cash—salary and performance-related cash compensation—and pension contributions). We also define the *option ratio* as the total value of option grants in year t over the total value of equity grants (options and stock) in year t. For firms in which the denominator is zero we define the option ratio to be zero. The option ratio captures the relative importance of options versus stock in CEOs' equity compensation. Since pay levels and the compensation ratios may vary year to year, we also study four-year averages (2003-2006) of the different pay variables.

Table 4.6 shows that there is substantial variation in total pay across financial institutions. Thus, in year 2006 almost 30% of firms do not pay any equity compensation and 42% of firms do not grant any stock options to their CEOs. For firms that do pay some equity compensation, the average and median ratios are around 45% and whereas firms in the bottom decile of the distribution do not reach 15%, firms in the top decile of the distribution of equity ratio pay more than 70% of total compensation in the form of equity. Of the firms that provide some equity compensation, almost 20% do not grant any options, whereas more than 10% of them pay all their equity compensation in the form of options. Among the firms that pay stock options, there is smaller but also significant heterogeneity. Although the fraction of firms with zero equity or option ratios is smaller once the ratios are averaged over the period 2003-2006, there is still

[35] There are some observations with very high AVV_S (which explains why the mean of AVV_S is higher than the 90th percentile). Winsorizing AVV, AVV_S, and AVV_O does not change the results.

substantial heterogeneity in the 2003-2006 averages. Therefore, it does not seem to be the case that the financial firms in our sample compensate their CEOs in a homogeneous way.

Panel C in Table 4.10 shows the differences in compensation practices between failed and surviving firms. As we discuss in Section 4.5.4, the average total pay is higher in failed firms, even if we cannot reject the test of equality of medians between the failed and surviving subsamples. However, there are no significant differences between the equity and option ratios of failed and surviving firms. The regression results reported in Table 4.11 also show that the coefficients of the equity and option ratios are not statistically significant at conventional significance levels. Tables 4.10 and 4.11 thus show that whereas pay levels may be associated with bank risk, there is no clear relation between compensation structure and risk.

Panel B in Table 4.10 displays the simple correlations between the compensation and the incentive variables. Focusing on the 2003-2006 averages (the results are similar for the year 2006 values), one can see that total pay is strongly and positively correlated with the incentive variables. The correlation between the incentive measures and the equity ratio is also positive, but smaller, and, remarkably—given the usual identification of options with risk taking incentives—the correlation between the incentive measures and the option ratio is essentially zero (even with a negative sign in the case of AVV). In Table 4.11, we display the results of regressions with our incentive measures as dependent variables and the compensation variables and firm size as controls. These results show that there is a negative—but not statistically significant at conventional significance levels—relation between the equity and option ratios and AVV. Therefore, if anything, firms with higher equity or option ratios have lower incentives to take on risk.

The results in this section, together with the results concerning termination payments discussed in Section 4.5, suggest that risk taking incentives at a point in time are not associated with any particular compensation vehicle or compensation structure. At most, our results suggest a weak relation between pay levels and risk and, less clearly, between termination payments and risk. Therefore, our results suggest that limiting the use of certain compensation vehicles may not be a fruitful way of controlling bank CEOs' incentives.

4.8 Robustness checks

4.8.1 Sample selection

The diversity of activities carried out by large financial institutions makes it difficult to come up with unambiguous sample selection criteria. For this reason and for the sake of comparability, we also conduct our analysis for the sample of financial institutions used by Fahlenbrach and Stulz (2011). Fahlenbrach and Stulz (2011)'s sample contains only 98 firms and is not a proper subset of our sample. For example, Fahlenbrach and Stulz (2011) include—and we do not—federal credit agencies, such as Fannie Mae. As Column 1 in Table 4.12 shows, the results are largely unchanged if we use this alternative sample of financial institutions. The only difference is that, whereas in our sample the coefficient for delta is not statistically significant, it becomes statistically significant for the Fahlenbrach and Stulz (2011)'s sample, in line with their results.

4.8.2 Failed institutions

Some of the steps of the procedure that we use to identify firms as failed requires the use of some judgement and soft information. In particular, as we discuss in Section 4.2, we consider as failed two firms (Mellon Financial and Countrywide Financial) that were acquired during the crisis but that cannot be said to clearly meet our merger discount requirements. We also consider as failed three firms (Merrill Lynch, National City Corp and Provident Bankshares) on the basis of information obtained from the media. Column 2 in Table 4.12 shows that results are largely unchanged if we consider that none of these five firms fail during the crisis. In unreported results, we also consider each of the two groups separately, and the results are identical.

4.8.3 Investment banks

Our sample contains three primary dealers (Bear Sterns, Goldman Sachs and Merrill Lynch) that supervisors do not identify as a regulated institution, but that we include because of their systemic importance. Moreover, our sample also contains the two other large investment banks. Lehman Brothers and Morgan Stanley, which the National Information Center of the FFIEC identifies as regulated institutions. To investigate whether our results are driven by the inclusion of the five large investment banks, we estimate the baseline regressions excluding them from the sample. As column 4 in Table 4.12 shows, the coefficients for the incentive variables remain highly statistically significant and increase in magnitude, because, as we explain below, some of the investment banks have very large values of the incentive variables. In unreported results, we observe that the results are similar if we exclude only the investment banks not identified as regulated institutions. Including a dummy for the investment banks (rather than excluding them from the sample) does not change the results relative to our baseline specification.

4.8.4 Too big to fail institutions

We identify as failed those firms that either close or are acquired with the intervention of regulators. However, some financial institutions may be too large for regulators to either allow them to fall or be able to find a suitable acquirer. These financial institutions may thus not be part of our list of failed institutions, even if they took on large risks ex ante and experienced strongly negative outcomes as a result of those risks. This possibility may bias our estimates towards zero if the risk taking incentives of too-big-to-fail (or be acquired) institutions are strong and these firms took on large risks. On the other hand, it may lead us to overestimate the relation between risk taking incentives and bank risk if, for example, large banks take on large risks yet opt for compensation arrangements with low values of AVV or LD.

We take two approaches to evaluate the potential biases generated by too-big-to-fail institutions. First, following Fahlenbrach et al. (2012), we consider Citigroup and Bank of America as failed, given the massive amount of aid they received from the government. As column 3 of Table 4.12 shows, considering these banks as failed does not alter our results. Second, we identify the banks in the sample that could be considered both too-big-to-fail and "to-big-to-be-acquired," banks, which we label TBTBA. There is obviously no official list of TBTBA firms, so we consider the robustness of our results to different definitions. Our first definitions take as TBTBA those firms larger than the largest failed institution in our sample (with size measured either as market capitalization or total assets in 2006).[36] The other two definitions use the Financial Stability Board's lists of systemically important financial institutions (created in 2011) and global systemically important banks (created in 2012). Our first definition defines as TBTBA all the U.S. institutions on the 2011 list. The 2012 list divides the systemically important financial institutions into five buckets, according to their level of systemic importance, with bucket five (one) containing the institutions with the greatest (smallest) systemic importance. Our second definition defines as TBTBA only those firms on the 2011 list that are in buckets two to five (the ones with the greatest systemic importance) of the 2012 list.[37] To evaluate the potential biases introduced by TBTBA institutions, we include a dummy variable for these firms in our regressions and run the regressions excluding the TBTBA firms from the sample. For the sake of brevity, we only report in columns 5-6 of Table 4.12 the results obtained when we exclude TBTBA banks, defined in terms of market capitalization or according to the 2011 list of systemically important institutions, from the sample. The results, which are essentially identical for the other definitions or when we include dummies instead of excluding banks from the sample, show that our results are not biased by the presence of TBTBA institutions.

4.8.5 Extreme values and specification

A possible concern about our results, especially given the small size of our sample, is that they may be influenced by the presence of firms with extreme values of the incentive measures. In fact, some firms, such as Bear Sterns, have very large values of AVV or leveraged delta. The presence of firms with very large values of an incentive measure in the group of failed banks may lead to a positive estimated coefficient even if there is no positive relationship between the incentive measure and failure. However, since the dependent variable lies between zero and one, the presence of banks with very large values of the incentive measures among the banks with a value of one for the dependent variable may have the opposite effect of biasing the estimated coefficient towards zero. To check the robustness of our results to the presence of firms with very high values of the incentive measures, we winsorize them at the 1% level and re-estimate the baseline univariate regression. As column 1 of Panel B in Table 4.12 shows for the case of AVV, the estimated coefficient remains highly statistically significant and increases threefold in magnitude. Therefore, if anything, the presence of large values of AVV is biasing our estimates downwards. We obtain similar results for LD.

A related concern is that our linear specification (given by expression 4.5) is necessarily misspecified, since the dependent variable is bounded between zero and one. Although this misspecification may not be severe in some cases, it may create substantial bias if, as it is the case with the incentive measures, the explanatory variable of interest has a skewed distribution. Therefore, we also consider the robustness of our results to different specifications that are nonlinear in the incentive measures. The first specification is a simple log linear model, in which we replace the incentive measure by the natural logarithm of one plus the incentive variable (we add one

[36] If size is measured by total assets, the largest failed institution is Merrill Lynch and the TBTBA institutions are Morgan Stanley, JPMorgan Chase, Bank of America and Citigroup. If size is measured by market capitalization in 2006, the largest failed institution is Wachovia and the TBTBA institutions are Wells Fargo, JPMorgan Chase, Bank of America and Citigroup.

[37] The 2011 and 2012 lists contain the same eight U.S. financial institutions: Bank of America, Bank of New York Mellon, Citigroup, Goldman Sachs, JPMorgan Chase, Morgan Stanley, State Street, and Wells Fargo. Buckets two to five contain all these banks except for State Street and Wells Fargo. Further restricting the list to buckets three to five would leave only Citigroup and and JPMorgan Chase as TBTBA. The list can be accessed at the Financial Stability Board's website: `https://www.financialstabilityboard.org/list/fsb_pa/tid_174/index.htm`.

because of the presence of firms with zero or close to zero values of the incentive measures). This specification allows for a concave relation between the incentive measures and the probability of failure and, at the same time, can be estimated by OLS. The estimated coefficient, which we report in Column 2 of Panel B in Table 4.12, is highly statistically significant. The marginal effect of an increase in AVV is 0.04 if AVV is evaluated at its mean and 0.13 if it is evaluated at its median. In columns 3 and 4 of Panel B in Table 4.12 we also report estimated marginal effects (evaluated at the sample means of the explanatory variables) of probit and logit models. The estimated marginal effects are larger than the coefficients of the linear probability model. Whereas the probit coefficient is significantly different from zero at the ten percent level, the logit estimate is not significantly different from zero at conventional significance levels (with a p-value equal to 0.14).

4.9 Conclusion

In this paper, we analyze the relation between the risk taking incentives created by executive compensation and bank risk and study both the potential determinants of those incentives and whether they are associated with the use of certain compensation vehicles (such as stock options or termination incentives).

To measure bank risk taking in the period prior to the 2007-2010 financial crisis we identify those banks that failed during the crisis. Because of the potential for government intervention to facilitate the acquisition of distressed banks by sounder financial institutions, we propose a definition of bank failure that identifies as failed not only those financial institutions that went bankrupt or were forced into receivership but also those that were acquired by others with the assistance or intervention of supervisors or the government. This ex post measure of bank risk aims to, on the one hand, sidestep the limitations of standard ex ante risk measures (which may not have been that informative about the actual risks taken by banks in the run-up to the crisis) and, on the other hand, measure the full risk borne by banks and not only the part borne by bank shareholders.

Since financial institutions are highly levered, we use measures of the risk taking incentives generated by CEO compensation that incorporate the incentives generated by the option-like nature of equity in levered institutions. In particular, we use the *asset volatility vega* (AVV) developed by Chesney et al. (2012) and propose as well a simple reduced form measure (*leveraged delta*) which is increasing both in the sensitivity of the CEO's wealth to changes in the firm's stock price (delta).

For our sample of large U.S. financial institutions, we show that the risk taking incentives implied by these measures are strong and that there is substantial dispersion in risk taking across firms. We also show that these risk taking incentives are associated with higher probability of failure during the financial crisis. We propose and investigate different potential explanations for these results and interpret our results as supporting two alternative explanations for the positive relationship between our measures of risk taking incentives and bank failure. The first explanation is that these incentives did have an impact on banks' risk choices prior to the crisis. The second explanation is that inherently riskier banks found it optimal to compensate their CEOs in ways that lead to high values of our incentive measures, even if either CEOs did not have the ability to determine bank risk or their choices were motivated by other incentives or constraints. However, to our knowledge there is no theory of the optimal compensation of bank executives that would yield this prediction. Moreover, to the extent that our incentive measures are really capturing incentives to take on risk, the measured incentives are strong, so to render them irrelevant, the incentives stemming from alternative sources (such as the threat of replacement) must be even stronger or the constraints faced by CEOs regarding their risk choices stringent.

We show that standard measures of governance quality, such as the Governance Index, the Entrenchment Index, board size, or board independence, do not help explain bank failure or the level of risk. In stark contrast, CEOs' risk taking incentives are almost perfectly correlated with a measure of shareholders' risk taking incentives, which we term *shareholder asset volatility vega*. These results suggest that either compensation incentives are designed to align CEOs' incentives with those of shareholders or, at least, that compensation policies are not set so as to counteract the risk taking incentives embedded in banks' equity.

Unexpectedly, we find no relationship between the weight of options in CEO compensation or the fraction of CEO pay in the form of stock or options and either bank failure or CEO risk taking incentives. We find also that there is at most a weak relation between termination payments (severance pay or golden parachutes) and bank failure. Therefore, we find that there is no particular compensation vehicle responsible for bank CEOs' incentives to take on risk.

Our results have several implications for bank supervision and regulation. First, our results are consistent with compensation being a significant source of risk taking incentives for bank executives and, therefore, suggest that some form of incentive regulation could modulate those incentives. However, we cannot make any strong policy recommendation because because of the lack of an exogenous source of variation in incentives does not allow us to identify the causal effect of compensation incentives on bank risk. Regarding the potential form that incentive regulation may take, our results suggest that it may be unwise to regulate bank CEOs' risk taking incentives by means of limits to particular forms of compensation. Defining and monitoring actual measures of risk taking incentives may be a more useful form of incentive supervision. Similarly, we find no support for the proposition that improving bank governance by, say, limiting managerial entrenchment or increasing board independence, would have a significant effect on risk taking incentives or bank risk. However, our results are silent regarding some governance failures specific to banks, which have also received attention from regulators, such as the financial background of directors, the quality of the risk management systems, or the relevance in the organization of the executives in charge of risk management. We should emphasize as well that even if we provide evidence that is consistent with an important role for compensation incentives in determining bank risk taking prior to the financial crisis, our results alone do not prove that those incentives were excessive.

The limitations of our analysis point at several promising avenues for future research. On the theory side, our results suggest that it may be useful to derive the optimal compensation contract for bank CEOs under different assumptions of the roles played by bank executives, boards of directors, and shareholder in determining and monitoring compensation decisions and risk choices. The implications of these models could then be taken to the data to shed light on the actual mechanism that links compensation and bank risk. The very different results obtained when option vega and asset volatility vega (or leveraged delta) are used as measures of incentives also suggest that more attention should be paid to deriving better measures of risk taking incentives. On the empirical side, finding credible sources of exogenous variation in incentives remains the main challenge to be addressed to be able to confidently propose policy recommendations regarding the compensation of bank executives.

4.10 Appendix

4.10.1 Risk Incentive Measures

Asset Volatility Vega (AVV) We follow the procedure described by Chesney et al. (2012) to compute the Asset Volatility Vega from stocks (AVV_S) and from options (AVV_O). Here we provide only the formulas that we use to compute the different variables and the data used to perform the computations. We refer to the article by Chesney et al. (2012), especially the appendix, for the derivation and details of the calculations.

We compute the Asset Volatility Vega from stocks (AVV_S) and from options (AVV_O) separately.

AVV_S for a single share of stock is defined as:

$$AVV_S = \frac{\partial BS(V, D, r, T, \sigma_v)}{\partial \sigma_V} \times 0.01, \tag{4.8}$$

where $BS(V, D, r, T, \sigma_v)$ is the Black-Scholes value of equity as a call option on the firm's value (see Chesney et al. (2012) for the detailed assumptions made to obtain this value) and σ_V is the volatility of asset value (all other variables are described below). It follows from the Black-Scholes formulation that:

$$AVV_S = \varphi(d_1(V, D, r, T, \sigma_V))V\sqrt{T}(1/100), \tag{4.9}$$

where

$$d_1 = \frac{ln(V/D) + (r + \sigma_V^2/2)T}{\sigma_V\sqrt{T}}. \tag{4.10}$$

To compute AVV_S, we multiply the AVV_S for a single share of stock by the number of shares held by the CEO.

Following Chesney et al. (2012), we define AVV_O for a given stock grant as:

$$AVV_O = \frac{\partial CC}{\partial \sigma_V} \times 0.01, \tag{4.11}$$

where CC is the value of the stock option computed according to the Compound Option Pricing model. The value of the derivative is obtained in **Proposition 1** of Chesney et al. (2012)'s appendix and is given by:

$$\begin{aligned}
\frac{\partial CC}{\partial \sigma_V} &= V\Bigg[\varphi(h+\sigma_V\sqrt{\tau_1})N_1\left(\frac{k+\sigma_V\sqrt{\tau_2}-\frac{\tau_1}{\tau_2}(h+\sigma_V\sqrt{\tau_1})}{\sqrt{1-\frac{\tau_1}{\tau_2}}}\right)\sqrt{\tau_1}\\
&+ \varphi(k+\sigma_V\sqrt{\tau_2})N_1\left(\frac{h+\sigma_V\sqrt{\tau_1}-\frac{\tau_1}{\tau_2}(k+\sigma_V\sqrt{\tau_2})}{\sqrt{1-\frac{\tau_1}{\tau_2}}}\right)\frac{d(k+\sigma_V\sqrt{\tau_2})}{d\sigma_V}\Bigg]\\
&- De^{-r\tau_2}\varphi(k)N_1\left(\frac{h-\sqrt{\frac{\tau_1}{\tau_2}}k}{\sqrt{1-\frac{\tau_1}{\tau_2}}}\right)\frac{dk}{d\sigma_V}, \qquad (4.12)
\end{aligned}$$

where:

$$k = \frac{ln(V/D)+(r-\frac{1}{2}\sigma_V^2)\tau_2}{\sigma_V\sqrt{\tau_2}}, \qquad (4.13)$$

$$h = \frac{ln(V/\bar{V})+(r-\frac{1}{2}\sigma_V^2)\tau_1}{\sigma_V\sqrt{\tau_1}}, \qquad (4.14)$$

$$\begin{aligned}
\frac{dk}{d\sigma_V} &= -\frac{k}{\sigma_V}-\sqrt{\tau_2}\\
\frac{d(k+\sigma_V\sqrt{\tau_2})}{d\sigma_V} &= -\frac{k}{\sigma_V}. \qquad (4.15)
\end{aligned}$$

See below for the definition of all variables.

To compute AVV_O, we first compute for each option contract held by the CEO the AVV_O for a single stock option and multiply it by the number of options held by the CEO. We then sum the AVV_O's of the different option grants.

Asset Volatility Vega (AVV) is defined as:

$$AVV = AVV_S + AVV_O. \qquad (4.16)$$

4.10.2 Variable definitions

- S: stock price
- D: book value of debt per share
- T: maturity of long-term debt (set equal to 7.5 years following Guay (1999))
- r: yield on Treasury bonds with time to maturity 7 years (the closest possible to 7.5)
- X_{debt}: weight of debt in the firm's capital structure.
- X_{equity}: weight of equity in the firm's capital structure.
- $\sigma_{equity} = \sigma_S$: annualized standard deviation of daily stock returns.

- σ_{debt}: annualized standard deviation of monthly (log) returns using the Merrill Lynch Bank of America Corporate Financial Bond Index using a five year period (Datastream mnemonic MLUCFIN(RY)).
- $Cov(\sigma_{debt}, \sigma_{equity}) = \sigma_{debt}\sigma_{equity}$ because we assume, following Guay(1999) that

$$Corr(\sigma_{debt}, \sigma_{equity}) = \frac{Cov(\sigma_{debt}, \sigma_{equity})}{\sqrt{\sigma_{debt}^2 \sigma_{equity}^2}} = 1. \tag{4.17}$$

- $\sigma_V^2 = X_{debt}^2 \sigma_{debt}^2 + X_{equity}^2 \sigma_{equity}^2 + 2X_{debt}X_{equity}\sigma_{debt}\sigma_{equity}$
- $N_1(.)$= standard normal cumulative distribution.
- $N_2(.)$= standard normal bivariate cumulative distribution.
- φ= standard normal probability density.
- τ_1= expiration of the stock option.
- τ_2= maturity of debt. If $\tau_2 < \tau_1$ then set $\tau_2 = \tau_1 + 2$.
- K= strike price of the option.
- $\bar{V}$= firm value where the option is just at the money at time τ_1. It comes from solving

$$VN_1(k + \sigma_V \sqrt{\tau_2 - \tau_1}) - De^{-r(\tau_2 - \tau_1)} N_1(k) - K = 0 \tag{4.18}$$

- V= per share firm value, as the implicit solution to the Black-Scholes equation:

$$S = VN(d_1) - De^{-rT} N(d_2), \tag{4.19}$$

where:

$$d2 = d1 - \sigma_V \sqrt{T} \tag{4.20}$$

and d_1 is as defined previously.

4.10.3 Sample Selection

4.10.4 Failed firms

Table 4.1: List of Financial Institutions Included in the Sample. Column *FFIEC* contains the institution type of each firm in the sample in year 2006, according to the firm's history at the FFIEC's National Information Center. The *Primary Dealer* column displays a 1 if the firm is listed as a primary dealer in 2006 according to the NY FED.

Number	Company Name	SIC	SICDESC	FFIEC	Primary Dealer
1	AMERICAN EXPRESS CO	6199	FINANCE SERVICES	S&LHC	
2	AMERIPRISE FINANCIAL INC	6211	SECURITY BROKERS & DEALERS	S&LHC	
3	ANCHOR BANCORP WISCONSIN INC	6035	SAVINGS INSTN,FED CHARTERED		
4	ASSOCIATED BANCCORP	6020	COMMERCIAL BANKS		
5	ASTORIA FINANCIAL CORP	6035	SAVINGS INSTN,FED CHARTERED		
6	BANCORPSOUTH INC	6020	COMMERCIAL BANKS		
7	BANK MUTUAL CORP	6035	SAVINGS INSTN,FED CHARTERED		
8	BANK OF AMERICA CORP	6020	COMMERCIAL BANKS		
9	BANK OF HAWAII CORP	6020	COMMERCIAL BANKS		
10	BANK OF NEW YORK MELLON CORP	6020	COMMERCIAL BANKS		
11	BANK OF THE OZARKS INC	6020	COMMERCIAL BANKS		
12	BANKUNITED FINANCIAL CORP	6035	SAVINGS INSTN,FED CHARTERED		
13	BB&T CORP	6020	COMMERCIAL BANKS		
14	BBCN BANCORP INC	6020	COMMERCIAL BANKS		
15	BBX CAPITAL CORP	6035	SAVINGS INSTN,FED CHARTERED		
16	BEAR STEARNS COMPANIES INC	6211	SECURITY BROKERS & DEALERS		1
17	BOSTON PRIVATE FINL HOLDINGS	6020	COMMERCIAL BANKS		
18	BROOKLINE BANCORP INC	6035	SAVINGS INSTN,FED CHARTERED		
19	CAPITAL ONE FINANCIAL CORP	6141	PERSONAL CREDIT INSTITUTIONS	FHC	
20	CASCADE BANCORP	6020	COMMERCIAL BANKS		
21	CATHAY GENERAL BANCORP	6020	COMMERCIAL BANKS		
22	CENTRAL PACIFIC FINANCIAL CP	6020	COMMERCIAL BANKS		
23	CHITTENDEN CORP	6020	COMMERCIAL BANKS		
24	CITIGROUP INC	6199	FINANCE SERVICES	FHC	1
25	CITY HOLDING CO	6020	COMMERCIAL BANKS		
26	CITY NATIONAL CORP	6020	COMMERCIAL BANKS		
27	COLONIAL BANCGROUP	6020	COMMERCIAL BANKS		
28	COLUMBIA BANKING SYSTEM INC	6020	COMMERCIAL BANKS		
29	COMERICA INC	6020	COMMERCIAL BANKS		
30	COMMERCE BANCORP INC/NJ	6020	COMMERCIAL BANKS		
31	COMMERCE BANCSHARES INC	6020	COMMERCIAL BANKS		
32	COMMUNITY BANK SYSTEM INC	6020	COMMERCIAL BANKS		
33	COMPASS BANCSHARES INC	6020	COMMERCIAL BANKS		
34	CORUS BANKSHARES INC	6020	COMMERCIAL BANKS		
35	COUNTRYWIDE FINANCIAL CORP	6162	MORTGAGE BANKERS & LOAN CORR	FHC	1
36	CULLEN/FROST BANKERS INC	6020	COMMERCIAL BANKS		
37	DIME COMMUNITY BANCSHARES	6035	SAVINGS INSTN,FED CHARTERED		
38	DOWNEY FINANCIAL CORP	6035	SAVINGS INSTN,FED CHARTERED		
39	E TRADE FINANCIAL CORP	6211	SECURITY BROKERS & DEALERS	S&LHC	
40	EAST WEST BANCORP INC	6020	COMMERCIAL BANKS		
41	FIFTH THIRD BANCORP	6020	COMMERCIAL BANKS		
42	FIRST BANCORP P R	6020	COMMERCIAL BANKS		
43	FIRST COMMONWLTH FINL CP/PA	6020	COMMERCIAL BANKS		
44	FIRST FINL BANCORP INC/OH	6020	COMMERCIAL BANKS		
45	FIRST FINL BANKSHARES INC	6020	COMMERCIAL BANKS		
46	FIRST HORIZON NATIONAL CORP	6020	COMMERCIAL BANKS		
47	FIRST INDIANA CORP	6020	COMMERCIAL BANKS		
48	FIRST MIDWEST BANCORP INC	6020	COMMERCIAL BANKS		
49	FIRST NIAGARA FINANCIAL GRP	6036	SAVINGS INSTN, NOT FED CHART		
50	FIRST REPUBLIC BANK	6020	COMMERCIAL BANKS		
51	FIRSTFED FINANCIAL CORP/CA	6035	SAVINGS INSTN,FED CHARTERED		
52	FIRSTMERIT CORP	6020	COMMERCIAL BANKS		
53	FLAGSTAR BANCORP INC	6035	SAVINGS INSTN,FED CHARTERED		
54	FRANKLIN BANK CORP	6036	SAVINGS INSTN, NOT FED CHART		
55	FRONTIER FINANCIAL CORP/WA	6020	COMMERCIAL BANKS		

Table 4.1: List of Financial Institutions Included in the Sample (continued). Column *FFIEC* contains the institution type of each firm in the sample in year 2006, according to the firm's history at the FFIEC's National Information Center. The *Primary Dealer* column displays a 1 if the firm is listed as a primary dealer in 2006 according to the NY FED.

Number	Company Name	SIC	SICDESC	FFIEC	Primary Dealer
56	FULTON FINANCIAL CORP	6020	COMMERCIAL BANKS		
57	GLACIER BANCORP INC	6020	COMMERCIAL BANKS		
58	GOLDMAN SACHS GROUP INC	6211	SECURITY BROKERS & DEALERS		1
59	GREATER BAY BANCORP	6020	COMMERCIAL BANKS		
60	GUARANTY FINANCIAL GROUP INC	6020	COMMERCIAL BANKS		
61	HANMI FINANCIAL CORP	6020	COMMERCIAL BANKS		
62	HUDSON CITY BANCORP INC	6035	SAVINGS INSTN,FED CHARTERED		
63	HUNTINGTON BANCSHARES	6020	COMMERCIAL BANKS		
64	INDEPENDENT BANK CORP/MI	6020	COMMERCIAL BANKS		
65	INDYMAC BANCORP INC	6162	MORTGAGE BANKERS & LOAN CORR	FSB	
66	INVESTORS FINANCIAL SVCS CP	6020	COMMERCIAL BANKS		
67	IRWIN FINANCIAL CORP	6020	COMMERCIAL BANKS		
68	JPMORGAN CHASE & CO	6020	COMMERCIAL BANKS		1
69	KEYCORP	6020	COMMERCIAL BANKS		
70	LEHMAN BROTHERS HOLDINGS INC	6211	SECURITY BROKERS & DEALERS	S&LHC	1
71	M & T BANK CORP	6020	COMMERCIAL BANKS		
72	MAF BANCORP INC	6035	SAVINGS INSTN,FED CHARTERED		
73	MARSHALL & ILSLEY CORP	6020	COMMERCIAL BANKS		
74	MELLON FINANCIAL CORP	6020	COMMERCIAL BANKS		
75	MERCANTILE BANKSHARES CORP	6020	COMMERCIAL BANKS		
76	MERRILL LYNCH & CO INC	6211	SECURITY BROKERS & DEALERS		1
77	MORGAN STANLEY	6211	SECURITY BROKERS & DEALERS	S&LHC	1
78	N B T BANCORP INC	6020	COMMERCIAL BANKS		
79	NATIONAL CITY CORP	6020	COMMERCIAL BANKS		
80	NATIONAL PENN BANCSHARES INC	6020	COMMERCIAL BANKS		
81	NEW YORK CMNTY BANCORP INC	6036	SAVINGS INSTN, NOT FED CHART		
82	NORTHERN TRUST CORP	6020	COMMERCIAL BANKS		
83	OLD NATIONAL BANCORP	6020	COMMERCIAL BANKS		
84	PACWEST BANCORP	6020	COMMERCIAL BANKS		
85	PEOPLE'S UNITED FINL INC	6036	SAVINGS INSTN, NOT FED CHART		
86	PINNACLE FINL PARTNERS INC	6020	COMMERCIAL BANKS		
87	PNC FINANCIAL SVCS GROUP INC	6020	COMMERCIAL BANKS		
88	POPULAR INC	6020	COMMERCIAL BANKS		
89	PRIVATEBANCORP INC	6020	COMMERCIAL BANKS		
90	PROSPERITY BANCSHARES INC	6020	COMMERCIAL BANKS		
91	PROVIDENT BANKSHARES CORP	6020	COMMERCIAL BANKS		
92	RAYMOND JAMES FINANCIAL CORP	6211	SECURITY BROKERS & DEALERS	S&LHC	
93	REGIONS FINANCIAL CORP	6020	COMMERCIAL BANKS		
94	S & T BANCORP INC	6020	COMMERCIAL BANKS		
95	SANTANDER HOLDINGS USA INC	6035	SAVINGS INSTN,FED CHARTERED		
96	SCHWAB (CHARLES) CORP	6211	SECURITY BROKERS & DEALERS	FHC	
97	SIMMONS FIRST NATL CP CL A	6020	COMMERCIAL BANKS		
98	SOUTH FINANCIAL GROUP INC	6020	COMMERCIAL BANKS		
99	STATE STREET CORP	6020	COMMERCIAL BANKS		
100	STERLING BANCORP/NY	6020	COMMERCIAL BANKS		
101	STERLING BANCSHARES INC/TX	6020	COMMERCIAL BANKS		
102	STERLING FINANCIAL CORP/WA	6036	SAVINGS INSTN, NOT FED CHART		
103	SUNTRUST BANKS INC	6020	COMMERCIAL BANKS		
104	SUSQUEHANNA BANCSHARES INC	6020	COMMERCIAL BANKS		
105	SVB FINANCIAL GROUP	6020	COMMERCIAL BANKS		
106	SWS GROUP INC	6211	SECURITY BROKERS & DEALERS	S&LHC	
107	SYNOVUS FINANCIAL CORP	6020	COMMERCIAL BANKS		
108	TCF FINANCIAL CORP	6020	COMMERCIAL BANKS		
109	TD BANKNORTH INC	6020	COMMERCIAL BANKS		
110	TOMPKINS FINANCIAL CORP	6020	COMMERCIAL BANKS		
111	TRUSTCO BANK CORP/NY	6035	SAVINGS INSTN,FED CHARTERED		
112	U S BANCORP	6020	COMMERCIAL BANKS		
113	UCBH HOLDINGS INC	6020	COMMERCIAL BANKS		
114	UMB FINANCIAL CORP	6020	COMMERCIAL BANKS		
115	UMPQUA HOLDINGS CORP	6020	COMMERCIAL BANKS		
116	UNIONBANCAL CORP	6020	COMMERCIAL BANKS		
117	UNITED BANKSHARES INC/WV	6020	COMMERCIAL BANKS		
118	UNITED COMMUNITY BANKS INC	6020	COMMERCIAL BANKS		
119	WACHOVIA CORP	6020	COMMERCIAL BANKS		
120	WASHINGTON FEDERAL INC	6035	SAVINGS INSTN,FED CHARTERED		

Table 4.1: List of Financial Institutions Included in the Sample (continued). Column *FFIEC* contains the institution type of each firm in the sample in year 2006, according to the firm's history at the FFIEC's National Information Center. The *Primary Dealer* column displays a 1 if the firm is listed as a primary dealer in 2006 according to the NY FED.

Number	Company Name	SIC	SICDESC	FFIEC	Primary Dealer
121	WASHINGTON MUTUAL INC	6035	SAVINGS INSTN,FED CHARTERED		
122	WEBSTER FINANCIAL CORP	6020	COMMERCIAL BANKS		
123	WELLS FARGO & CO	6020	COMMERCIAL BANKS		
124	WESTAMERICA BANCORPORATION	6020	COMMERCIAL BANKS		
125	WHITNEY HOLDING CORP	6020	COMMERCIAL BANKS		
126	WILMINGTON TRUST CORP	6020	COMMERCIAL BANKS		
127	WILSHIRE BANCORP INC	6020	COMMERCIAL BANKS		
128	WINTRUST FINANCIAL CORP	6020	COMMERCIAL BANKS		
129	ZIONS BANCORPORATION	6020	COMMERCIAL BANKS		

Table 4.2: List of Failed Institutions in the Sample. Columns *Year* and *Month* represent the last year and month, respectively, for which we have information for the corresponding firm in CRSP.

Company Name	GVKEY	Year	Month	STEP 1	STEP 2	STEP 3	STEP 4	Failed
BANKUNITED FINANCIAL CORP	16684	2009	4	1				1
BEAR STEARNS COMPANIES INC	11818	2008	5		1			1
COLONIAL BANCGROUP	14201	2009	7	1				1
CORUS BANKSHARES INC	17160	2009	8	1				1
COUNTRYWIDE FINANCIAL CORP	3555	2008	6		1			1
DOWNEY FINANCIAL CORP	4065	2008	10	1				1
FIRSTFED FINANCIAL CORP	14129	2009	2	1				1
FRANKLIN BANKCORP	155736	2008	10	1				1
FRONTIER FINANCIAL CORP/WA	109584	2010	4	1				1
GUARANTY FINANCIAL GROUP INC	179079	2009		1				1
INDYMAC BANCORP INC	13166	2008	6	1				1
IRWIN FINANCIAL CORP	18928	2009	8	1				1
LEHMAN BROTHERS HOLDINGS INC	30128	2008	8			1		1
MELLON FINANCIAL CORP	7238	2007	6		1			1
MERRILL LYNCH & CO INC	7267	2008	12				1	1
NATIONAL CITY CORP	7711	2008	12				1	1
PROVIDENT BANKSHARES CORP	17030	2009	4				1	1
SOUTH FINANCIAL GROUP INC	17640	2010	9		1			1
UCBH HOLDINGS INC	115566	2009	10	1				1
WACHOVIA CORP	4739	2008	12		1			1
WASHINGTON MUTUAL INC	16243	2008	8	1				1

Table 4.3: Firm characteristics: Summary Statistics. *Market Cap.* is the firm's market capitalization computed as total common equity multiplied by the price of the stock at the close of the calendar year. *Total Assets* is the book value of the total assets of the firm. Market Cap. and Total Assets are measured in billions of dollars. *Leverage* is the quasi-market value of leverage computed as the ratio of book value of assets minus book value of equity plus market value of equity divided by market value of equity, *ROA* is the ratio of operating income before depreciation over total assets at the end of the previous year. Unless specified otherwise, all variables are measured in 2006. *Panel A* displays summary statistics for the sample used in this paper. *Panel B* displays descriptives for the entire population of firms available in Compustat for year 2006 with SIC codes between 6000 and 6050. *Panel C* contains the means and medians of the variables of interest for the subsamples of failed and surviving institutions in our sample. Asterisks in the mean and median columns of the group of failed institutions represent statistically significant differences according to the t-test of means and the rank-sum test for differences in medians. *, ** and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Firms in the sample

	Count	Mean	SD	p10	p50	p90
Market Cap	125	466.01	1257.75	7.12	36.67	1204.44
Total Assets	125	106.81	288.33	2.85	11.16	199.95
Leverage	125	6.34	2.79	3.96	5.66	8.71
ROA	125	0.03	0.01	0.02	0.03	0.05

Panel B: Compustat population (SIC codes 6000–6050)

	Count	Mean	SD	p10	p50	p90
Market Cap	749	113.23	615.30	0.40	2.15	78.32
Total Assets	778	41.37	203.17	0.28	1.01	20.86
Leverage	746	7.28	3.19	4.31	6.52	10.97
ROA	759	0.02	0.03	0.01	0.02	0.04

Panel C: Surviving vs. failed banks

	Surviving		Failed	
	Mean	Median	Mean	Median
Market Cap	421.19	33.29	716.07	91.60*
Total Assets	95.16	10.76	171.79	22.78
Leverage	5.97	5.41	8.43***	8.32***
ROA	0.03	0.03	0.04**	0.03
N	106		19	

4.10.5 Tables

Table 4.4: Incentive Measures: Summary Statistics. *AVV* is the change in the value of the CEO's portfolio of stocks and options (measured in $ million) associated with a 0.01 change in the standard deviation of the value of the assets of the firm. *LD* is the standardized product of Leverage and Delta, where Leverage is the quasimarket value of leverage, as defined in Table 4.3, and Delta is the change in the value of the CEO's portfolio of stock and options (measured in $ million) associated with a 0.01 change in the price of the stock of the firm. *OV* is the change in the value of the CEO's option portfolio (measured in $ million) associated with a change of 0.01 in the standard deviation of the price of the stock. Unless specified otherwise, all variables are measured in 2006. *Panel A* contains summary statistics. *Panel B* contains pairwise correlation between the incentive variables in year 2006. *Panel C* contains the means and medians of the variables of interest for the subsamples of failed and surviving institutions in our sample. Asterisks in the mean and median columns of the group of failed institutions represent statistically significant differences according to the t-test of means and the rank-sum test for differences in medians. *, ** and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Firm level variables

	Count	**Mean**	**SD**	**p10**	**p50**	**p90**
AVV	125	2.65	10.38	0.02	0.26	5.20
LD	125	0.40	1.00	0.01	0.09	1.01
OV	125	0.32	0.56	0.00	0.08	0.90
Delta	125	1.34	4.24	0.04	0.37	2.97

Panel B: Pairwise correlations

	AVV	LD	OV	Delta
AVV	1			
LD	0.84	1		
OV	0.16	0.26	1	
Delta	0.25	0.72	0.24	1

Panel C: Differences in means and medians between failed and surviving banks

	Surviving		Failed	
	Mean	Median	Mean	Median
AVV	1.27	0.19	10.34***	2.23**
LD	0.28	0.08	1.05***	0.43*
OV	0.30	0.07	0.46	0.15
Delta	1.22	0.30	1.99	1.03
N	106		19	

Table 4.5: Univariate Regressions. The table present estimated coefficients of different specifications of a linear probability model, in which the dependent variable is *Failed*. Failed is a dummy variable equal to 1 if the firm has been closed by the intervention of a Federal Regulator in the period 2007–2010. AVV is the change in the value of the CEO's portfolio of stocks and options (measured in $ million) associated with a 0.01 change in the standard deviation of the value of the assets of the firm. LD is the standardized product of Leverage and Delta, where Leverage is the quasi-market value of Leverage as defined in Table 4.3, and Delta is the change in the value of the CEO's portfolio of equity (measured in $ million) associated with a 0.01 change in the price of the stock of the firm. OV is the change in the value of the CEO's portfolio of options (measured in $ million) associated with a change of 0.01 in the standard deviation of the stock price. AVV, LD, OV, and *Delta* are measured in year 2006 in millions of dollars. *, ** and *** represent significance levels at 10%, 5%, and 1%, respectively. The number of observations is 125. Robust standard errors in parentheses.

	(1)	(2)	(3)	(4)
AVV	0.011***			
	(0.003)			
LD		0.100***		
		(0.036)		
OV			0.065	
			(0.067)	
Delta				0.006
				(0.009)
R^2	0.099	0.077	0.010	0.004

Table 4.7: Multivariate Results. The table presents the estimated coefficients of different specifications of a linear probability model. The dependent variable in all columns is *Failed*, which is a dummy variable equal to 1 if the firm has been closed with the intervention of a Federal Regulator in the period 2007–2010. *AVV* is the change in the value of the CEO's portfolio of stocks and options (measured in $ million) associated with a 0.01 change in the standard deviation of the value of the assets of the firm. *LD* is the standardized product of Leverage and Delta, where Leverage is the quasi-market value of Leverage as defined in Table 4.3, and Delta is the change in the value of the CEO's portfolio of equity (measured in $ million) associated with a 0.01 change in the price of the stock of the firm. *Total pay* is the total compensation received by the executive, and it comprises salary, bonus, other annual payments, restricted stock grants, LTIP Payouts, other compensation, and the value of option grants. *G. Parachute* and *Severance Pay* are the amounts of the contingent payments upon termination with and without a change in control, respectively, as in year 2006's proxy statements. *Non-firm wealth* is the non- firm wealth of the CEO, as defined by Dittmann and Maug (2007). *Leverage* is the quasi-market value of leverage as defined in Table 4.3 and *Leverage_sq* is leverage squared. *CEO age* and *CEO tenure* denote the age and years in office, respectively, of the CEO as in year 2006. *Panel A* displays multivariate results where the risk taking incentive measure is AVV. *Panel B* displays similar results with LD as the measure of risk taking incentives. *, ** and *** represent significance levels at 10%, 5% and 1% respectively. Robust standard errors in parentheses.

Panel A: AVV and bank failure

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
AVV	0.010***	0.007***	0.010***	0.011***	0.010***	0.010***	0.060***	0.060***	0.009***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.020)	(0.020)	(0.002)
Firm Size (03)	0.014	−0.030	0.016	0.015	0.015	0.026	−0.017	−0.015	0.000
	(0.020)	(0.029)	(0.021)	(0.020)	(0.020)	(0.023)	(0.022)	(0.024)	(0.020)
Total Pay		0.010							
		(0.006)							
Delta			−0.003						
			(0.002)						
CEO Age				−0.004					
				(0.005)					
CEO tenure					0.001				
					(0.005)				
Non-firm wealth						−0.000			
						(0.000)			
Severance Pay							0.000		
							(0.002)		
G. Parachute								−0.000	
								(0.002)	
Leverage									0.115**
									(0.046)
Leverage sq									−0.005**
									(0.002)
N	125	123	125	125	125	122	118	118	125
R^2	0.103	0.129	0.104	0.110	0.104	0.112	0.160	0.160	0.174

Panel B: LD and bank failure

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
LD	0.090**	0.060	0.164***	0.098**	0.089**	0.103***	0.088	0.074	0.084***
	(0.039)	(0.036)	(0.047)	(0.039)	(0.039)	(0.034)	(0.095)	(0.092)	(0.031)
Firm Size (03)	0.013	−0.037	0.011	0.013	0.013	0.028	0.018	0.016	−0.005
	(0.022)	(0.029)	(0.021)	(0.022)	(0.022)	(0.024)	(0.025)	(0.026)	(0.022)
Total Pay		0.012*							
		(0.006)							
Delta			−0.024***						
			(0.006)						
CEO Age				−0.005					
				(0.005)					
CEO tenure					0.002				
					(0.005)				
Non-firm wealth						−0.000			
						(0.000)			
Severance Pay							−0.002		
							(0.003)		
G. Parachute								−0.000	
								(0.002)	
Leverage									0.122**
									(0.047)
Leverage sq									−0.005**
N	125	123	125	125	125	122	118	118	125
R^2	0.079	0.115	0.116	0.087	0.080	0.095	0.031	0.029	0.170

Table 4.8: Governance Variables: Summary Statistics. *G-index* is the Governance index defined as in Gompers et al (2003), *E-index* is the entrenchment index as defined by Bebchuck et al. (2009), *Boardsize* is the number of members of the board of directors, *Independence* is the number of independent directors divided by board size, *SAVV* is the stock return associated with a change of 0.01 in the standard deviation of the asset value of the firm measured in 2006. *AVV_S* is the change in value of the stock portfolio held by the CEO after a change of 0.01 in the standard deviation of the asset value of the firm. *AVV_O* is the change in value of the option portfolio held by the CEO after a change of 0.01 in the standard deviation of the asset value of the firm. All variables are measured in year 2006 unless stated otherwise. *Panel A* contains summary statistics for the governance variables and *Panel B* contains pairwise correlations between the main variables of interest.

Panel A: Summary statistics

	Count	**Mean**	**SD**	**p10**	**p50**	**p90**
G - index	105	10.03	2.76	7.00	10.00	13.00
E - index	105	2.95	1.31	1.00	3.00	4.00
Board Size	103	13.91	3.88	9.00	14.00	19.00
Independence	121	0.72	0.12	0.55	0.75	0.87
SAVV	125	0.49	1.72	0.00	0.11	1.07
AVV_S	125	1.66	9.73	0.00	0.04	1.15
AVV_O	125	0.99	2.00	0.00	0.18	2.13

Panel B: Pairwise correlations

	AVV	LD	G - index	E - index	Board Size	Independence	SAVV	AVV_S
G - index	−0.10	−0.08	1.00					
E - index	−0.27	−0.28	0.73	1.00				
Board Size	−0.05	−0.05	−0.04	−0.13	1.00			
Independence	−0.23	−0.15	−0.08	0.04	−0.03	1.00		
SAVV	0.97	0.80	−0.11	−0.29	−0.08	−0.25	1.00	
AVV_S	0.98	0.81	−0.10	−0.27	−0.07	−0.27	0.97	1.00
AVV_O	0.41	0.44	−0.02	−0.07	0.06	0.10	0.30	0.23

Table 4.9: Governance, Risk Taking Incentives and Bank Failure. *Panel A* displays estimations for the linear probability model with *Failed* as dependent variable in all columns. *Failed* is a dummy variable equal to 1 if the firm has been closed with the intervention of a Federal Regulator in the period 2007–2010. *G-index* is the Governance index defined as in Gompers et al (2003), *E-index* is the entrenchment index as defined by Bebchuck et al. (2009), *Boardsize* is the number of members of the board of directors, *Independence* is the number of independent directors divided by board size. *AVV* is the change in the value of the CEO's portfolio of stocks and options with a 0.01 change in the standard deviation of the value of the assets of the firm. *SAVV* is the stock return associated with a change of 0.01 in the standard deviation of the asset value of the firm. *AVV_S* is the change in value of the stock portfolio held by the CEO after a change of 0.01 in the standard deviation of the asset value of the firm. *AVV_O* is the change in value of the option portfolio held by the CEO after a change of 0.01 in the standard deviation of the asset value of the firm. All variables are measured in year 2006 unless stated otherwise. *Firm_Size* is the natural logarithm of total assets as of year 2003. *Panel B* displays coefficient estimates of linear probability model estimations where the dependent variable is AVV. *Panel C* shows results for the linear probability model with Failure as the dependent variable. *, ** and *** represent significance levels at 10%, 5%, and 1%, respectively. Robust standard errors in parentheses.

Panel A: Governance, risk taking incentives, and bank failure

	(1)	(2)	(3)	(4)	(5)
AVV	0.010***	0.009***	0.009***	0.010***	0.010***
	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)
G - index	0.010				
	(0.011)				
E - index		−0.011			0.018
		(0.026)			(0.025)
Board Size			−0.001		0.004
			(0.010)		(0.011)
Independence				0.039	0.248
				(0.259)	(0.285)
				(0.027)	
Firm Size	0.024	0.020	0.029	0.025	0.021
	(0.023)	(0.025)	(0.023)	(0.020)	(0.027)
N	105	105	103	121	88
R^2	0.122	0.118	0.132	0.120	0.140

Panel B: Governance and risk taking incentives. AVV as dependent variable

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
G - index	−0.234								
	(0.227)								
E - index		−1.514							−1.617
		(1.412)							(1.371)
Board Size			−0.624*						−0.7704*
			(0.322)						(0.391)
Independence				−19.295					−33.529
				(19.810)					(26.808)
AVV_S					1.015***				
					(0.011)				
AVV_O						1.525***			
						(0.482)			
SAVV							5.730***		
							(0.281)		
SAVV 03								5.675***	
								(0.965)	
Firm Size	2.500**	2.198***	2.887**	2.276***	0.702***	1.169	0.435**	−0.164	3.046***
	(1.003)	(0.742)	(1.156)	(0.849)	(0.140)	(0.777)	(0.182)	(0.308)	(1.048)
N	105	105	103	121	125	125	125	96	88
R^2	0.139	0.164	0.180	0.188	0.977	0.190	0.945	0.877	0.315
10									

Panel C: Governance and failure. Dependent variable: Failure

	(1)	(2)	(3)	(4)	(5)
G - index	0.007				
	(0.011)				
E - index		−0.026			0.001
		(0.028)			(0.028)
Board Size			−0.006		−0.004
			(0.010)		(0.011)
Independence				−0.1474	−0.105
				(0.280)	(0.344)
				(0.026)	
Firm Size	0.048**	0.041	0.054**	0.047**	0.0532*
	(0.024)	(0.026)	(0.024)	(0.021)	(0.028)
N	105	105	103	121	88
R^2	0.046	0.050	0.065	0.053	0.056

Table 4.10: Compensation Policies: Summary Statistics. *Equity ratio* is the fraction of a CEO's annual total pay that is granted in the form of equity pay (options and stock). *Option ratio* is the value of all stock option grants awarded in a year divided by total equity pay (options and stock). *Panel A* displays summary statistics for year 2006 for the whole sample as well as for the subsample of executives with a positive value of the corresponding ratio (>0). *Panel B* displays summary statistics for the ratios averaged over the period 2003–2006. *Panel C* contains simple correlation coefficients.

Panel A: Summary statistics (year 2006)

	Count	**Mean**	**SD**	**p10**	**p50**	**p90**
Equity ratio (all)	123	0.33	0.28	0.00	0.35	0.68
Option ratio (all)	123	0.38	0.41	0.00	0.23	1.00
Equity ratio (> 0)	88	0.46	0.22	0.15	0.45	0.71
Option ratio (> 0)	71	0.66	0.33	0.20	0.64	1.00

Panel B: Summary statistics (average 2003- 2006)

	Count	**Mean**	**SD**	**p10**	**p50**	**p90**
Equity ratio (avg - all)	123	0.36	0.24	0.00	0.37	0.65
Option ratio (avg - all)	123	0.48	0.32	0.00	0.50	1.00
Equity ratio (avg > 0)	111	0.40	0.21	0.12	0.41	0.66
Option ratio (avg > 0)	106	0.56	0.28	0.20	0.55	1.00

Panel C: Correlations for averaged values (2003-2006)

	AVV (avg)	LD (avg)	Equity ratio (avg)	Option ratio (avg)
Equity ratio (avg)	0.23	0.27	1.00	
Option ratio (avg)	−0.04	0.05	0.20	1.00

Table 4.11: Compensation policies, Risk Taking Incentives, and Failure. *Panel A* contains estimated coefficient of linear probability models with *Failed* as dependent variable. *Equity ratio (avg)* and *Option ratio (avg)* are the averages for each firm of *Equity ratio* and *Option ratio*, respectively, over the period 2003–2006. Firm size is the log of total assets as of year 2006. *Panel B* contains the results of multivariate regressions where the dependent variable is AVV, as defined previously. *, **, and *** represent significance levels at 10%, 5%, and 1%, respectively. Robust standard errors in parentheses.

Panel A: Compensation policies and failure

	(1)	(2)	(3)	(4)
Total Pay (avg)	0.016**			0.018***
	(0.007)			(0.006)
Equity ratio (avg)		−0.234		−0.325*
		(0.181)		(0.167)
Option ratio (avg)			−0.099	−0.029
			(0.110)	(0.100)
Firm Size	−0.026	0.061**	0.042*	−0.008
	(0.032)	(0.028)	(0.022)	(0.034)
N	123	123	123	123
R^2	0.085	0.051	0.044	0.114

Panel B: Compensation policies and AVV

	(1)	(2)	(3)	(4)
Total Pay	0.637*			0.686*
	(0.382)			(0.412)
Equity ratio		−1.972		−5.558
		(2.811)		(4.268)
Option ratio			−2.249	−0.437
			(1.931)	(1.056)
Firm Size	−0.943	2.454**	2.363**	−0.741
	(1.287)	(1.088)	(0.960)	(1.175)
N	123	123	123	123
R^2	0.269	0.138	0.144	0.287

Table 4.6: Alternative Explanations: Summary Statistics. *Total pay* is the total compensation received by the executive, and it comprises salary, bonus, other annual payments, restricted stock grants, LTIP Payouts, other compensation, and the value of option grants. *G. Parachute* and *Severance Pay* are the amounts of the contingent payments upon termination with and without a change in control, respectively, as in year 2006's proxy statements. *Non-firm wealth* is the non- firm wealth of the CEO, as defined by Dittmann and Maug (2007). All compensation variables are measured in millions of dollars. Unless specified otherwise, all variables are measured in 2006. *Panel A* contains summary statistics and *Panel B* reports pairwise correlations for the variables of interest.

Panel A: Summary statistics

	Count	**Mean**	**SD**	**p10**	**p50**	**p90**
Total Pay	123	6.97	10.43	0.67	2.20	20.37
CEO age	125	57.45	6.69	49.00	58.00	65.00
CEO tenure	125	9.01	6.85	1.50	7.00	17.51
Non-firm wealth	122	29.42	99.61	0.45	5.16	56.23
Severance Pay	118	6.32	13.28	0.00	0.71	18.40
G. Parachute	118	12.40	19.80	0.00	5.05	39.22

Panel B: Differences in means and medians between failed and surviving banks

	Surviving			Failed		
	Count	Mean	Median	Count	Mean	Median
Total Pay	104	5.68	2.12	19	14.01***	2.23
CEO Age	106	57.49	58.00	19	57.21	58.00
CEO tenure	106	8.88	6.67	19	9.70	8.77
Non Firm Wealth	103	26.31	4.31	19	46.32	13.14
Severance Pay	101	6.02	1.11	17	8.11	0.00
G. Parachute	101	11.81	5.22	17	15.88	4.80

Panel C: Pairwise correlations

	AVV	LD	OV	Firm Size (03)	Leverage	Total Pay	CEO Age	CEO tenure	Non Firm Wealth	Severance Pay
Firm Size (03)	0.34	0.43	0.63	1						
Leverage	0.56	0.42	0.02	0.29	1					
Total Pay	0.51	0.55	0.57	0.79	0.34	1				
CEO Age	0.19	0.25	0.14	0.11	0.09	0.1	1			
CEO tenure	0.07	0.06	0.06	−0.03	0.05	−0.1	0.33	1		
Non Firm Wealth	0.29	0.48	0.36	0.47	0.24	0.64	0.21	−0.06	1	
Severance Pay	0.18	0.54	0.25	0.37	−0.02	0.38	0.09	−0.05	0.52	1
G. Parachute	0.27	0.36	0.32	0.44	−0.01	0.46	0.08	−0.02	0.45	0.68

Table 4.12: Robustness Checks *Panel A* contains results for univariate regressions where the dependent variable is Failed (defined as in Table 4.3). for each model we report the value of the coefficient, the standard errors (s.e.), the sample size and the R^2. In column (i) we restrict the sample to the one used in Fahlenbrach and Stulz (2011). Column (ii) contains results using an alternative definition of *Failed* that considers Merrill Lynch, National City, Provident, Mellon Financial and Countrywide as *not* failed. Column (iii) uses a definition of *Failed* that considers all the firms mentioned in column (ii) as failed as well as Citigroup and Bank of America. Column (iv) excludes investment banks from the sample. Column (v) excludes firms that are too-big-to-be-acquired (TBTBA) in terms of market capitalization. Column (vi) excludes excludes firms that are too-big-to-be-acquired according to the FSB's 2011 list of systemically important banks. *Panel B* contains univariate regressions where the dependent variable is *Failed.* In column (1) the independent variable is AVV winsorized at the 1% level. In column (2) the independent variable is the natural logarithm of 1 plus AVV. Column (3) reports probit marginal effects, and column (4) reports logit marginal effects (evaluated at the sample means). *, ** and *** represent significance levels at 10%, 5%, and 1%, respectively. Robust standard errors in parentheses.

Panel A: Sample selection, failure definition, and too-big-to-be-acquired

	(i)		(ii)		(iii)		(iv)		(v)		(vi)	
	Coef.	N	Coef.	N	Coef.	N	Coef.	N	Coef.	N	Coef.	N
	s.e.	R^2	s.e.	R^2	s.e.	R^2	s.e.	R^2	s.e.	R^2	s.e.	R^2
AVV	0.01***	97	0.01***	125	0.01***	125	0.05**	116	0.01***	120	0.01***	117
	(0.00)	0.098	(0.00)	0.105	(0.00)	0.099	(0.02)	0.120	(0.00)	0.104	(0.00)	0.119
LD	0.14***	97	0.09***	125	0.10***	125	0.29**	116	0.10***	120	0.11***	117
	(0.04)	0.110	(0.03)	0.080	(0.04)	0.077	(0.13)	0.079	(0.04)	0.081	(0.04)	0.094
OV	0.07	98	0.05	125	0.07	125	0.06	116	0.08	120	0.13	117
	(0.08)	0.009	(0.06)	0.007	(0.07)	0.010	(0.07)	0.008	(0.08)	0.012	(0.09)	0.028
Delta	0.08***	97	0.01	125	0.01	125	0.05	116	0.01	120	0.01	117
	(0.03)	0.093	(0.01)	0.005	(0.01)	0.004	(0.04)	0.026	(0.01)	0.005	(0.01)	0.006

Panel B: alternative specifications and extreme values

	(1)	(2)	(3)	(4)
	LPM	LPM	Probit	Logit
WAV	0.03***			
	(0.01)			
LAVV		0.17***		
		(0.04)		
AVV			0.02*	0.02
			(0.01)	(0.01)
N	125	125	125	125
R^2	0.127	0.162		
Pseudo R^2			0.110	0.107

5

Too Big to Discipline?

Bank supervision entails both monitoring financial institutions and compelling them to take corrective actions if they do not comply with regulations or follow unsafe or unsound practices. The main tool to compel regulated institutions to change their practices is the issuance of enforcement actions, which direct financial institutions to take (or prevent them from taking) certain actions specified by the supervisor. For example, an enforcement action may prompt a bank to maintain a certain level of capital or an adequate allowance for loan and lease losses or may prevent a bank from paying out dividends or acquiring other institutions.

Bank regulation in the US requires supervisors to disclose the formal enforcement actions issued against banks. This requirement presents a challenge for supervisors, who must trade off two effects of the issuance of a formal enforcement action. On the one hand, the enforcement action is expected to have a direct and positive effect on the bank's condition by forcing the bank to take corrective actions to improve such condition. On the other hand, the disclosure of the enforcement action, by revealing to investors and depositors the condition of the bank, may lead to a run on the bank or affect the stability of the banking sector if investors and depositors extrapolate from the enforcement action that other banks may also be in trouble. In this paper, we investigate whether bank supervisors trade off these two effects differently for very large banks. In particular, we investigate whether there are banks that are "too large to discipline" by means of enforcement actions.

The answer to this question has important implications for the risk taking incentives of large financial institutions. If supervisors are less likely to issue formal enforcement actions against these financial institutions, the latter's incentives to take on risk will be stronger for two reasons. First, large banks will expect that they will be not be forced to correct unsafe, yet profitable, practices. Second, large banks will expect a softer market discipline, since supervisors' reluctance to issue enforcement actions may have the effect of not revealing negative realizations of bank risk to market participants.

To investigate the possibility that supervisors are less likely to issue formal enforcement actions against very large banks, we collect all formal enforcement actions issued against a sample of large bank holding companies and their bank subsidiaries in the period 2007–2010. We analyze the text of these enforcement actions to determine which ones are related to bank risk, as opposed to those related to compliance with specific bank regulations—such as the Bank Secrecy Act, anti-money laundering regulations, or the Community Reinvestment Act. Our first result is that in the 2007–2010 period bank supervisors issued only one risk-related enforcement action against the top 50 financial institutions. We then estimate the relation between bank holding company size and the probability that a risk-related formal enforcement action is issued against the bank holding company or its subsidiaries and find that, within our sample of large banks, the very large banks (which we label too-big-to-discipline or, simply, TBTD) are less likely to receive an enforcement action, controlling for other predictors of the issuance of enforcement actions.

TBTD banks are highly complex institutions and their activities, operations, and management may differ substantially from those of banks of smaller size. Therefore, a possible explanation for our results is that TBTD institutions are less likely to receive formal enforcement actions because they are less risky. To investigate this possibility we identify the bank holding companies that fail during the financial crisis. We consider that a company fails if it is either closed by supervisors or acquired by other financial institutions with supervisors' intervention and support. We show that, in contrast to the case of enforcement actions, TBTD financial institutions are not significantly less likely to fail during the crisis than large, yet relatively smaller, ones. This result suggests, although we also consider alternative explanations, that TBTD banks did not take on less risk than smaller banks, which could have, otherwise, explained the relation between bank size and the issuance of enforcement actions.

In this paper, we explore whether there is another dimension of regulatory forbearance in bank supervision, not considered in previous literature, namely the reluctance to issue enforcement actions against very large institutions. Therefore, the paper is very much related to the broader literature on regulatory forbearance and, more specifically, on too-big-to-fail policies. Several articles in this literature have documented the value of being perceived as too-big-to-fail (see, e.g., O'hara and Shaw (1990), Kane (2000), Penas and Unal (2004), Morgan and Stiroh (2005), Rime (2005)). Our paper provides another another reason for the existence of a TBTF premium beyond the implicit government guarantee in case of likely insolvency.

The paper is also tightly related to the literature that studies the optimal disclosure of supervisory information to markets. In particular, there has been a long debate as to whether supervisors should disclose the results of on-site examinations of regulated banks (see, e.g., Jordan et al. (1999) or Prescott (2008)). A supervisor's decision whether to issue a formal enforcement action against a bank is, as we describe in detail in Section 5.1, tightly related to the confidential results of on-site bank examinations performed by the supervisor. By issuing an enforcement action, a supervisor, thus, reveals part of the confidential information obtained through on-site inspections. Therefore, whether supervisors' concerns about the disclosure of enforcement actions are justified depends on the extent to which on-site examinations provide information that is, otherwise, not available to market participants. Slovin et al. (1999) and Jordan et al. (2000) show that banks experience negative abnormal returns upon the announcement of enforcement actions. However, Jordan et al. (1999) find that the disclosure of enforcement actions in the midst of the Savings and Loans crisis did not cause bank runs or otherwise had any destabilizing effect. Berger and Davies (1998) and DeYoung et al. (2001) show that bank examinations produce information not already incorporated in security prices, although Cole and Gunther (1998) and Berger et al. (2000) find that this information degrades in a few months. The recent financial crisis has revived this debate, especially in relation to the disclosure of the results of the stress-tests performed during the crisis (see, e.g., Goldstein and Sapra (2014)).

5.1 Enforcement Actions

An enforcement action is a supervisory tool that allows the regulator to direct the behavior of banking firms to ensure that it complies with laws and regulations and is consistent with sound banking practices. Enforcement actions are triggered when regulators find evidence of unsound or unsafe practices or conditions. The notion of unsound or unsafe practices is very broad and encompasses, among others, the violation of laws and regulations, operating with an inadequate level of capital or liquidity or without adequate internal controls, engaging in hazardous lending and lax collection practices or in speculative or hazardous investment policies, or the lack of effective risk management practices. Through enforcement actions, regulatory agencies have the power to, among other things, improve capital, restrict asset growth and risky lending, restrict dividends, levy fines, and remove management.

Enforcement actions can be issued against financial institutions of individuals. We will focus on actions issued against financial institutions, because institutional enforcement actions are related to the overall condition of the firm, while actions against individuals are generally related to the commission of fraud and non-compliance with fiduciary duties and not necessarily represent the overall situation of the firm. Both stand-alone depository institutions and bank holding companies can be targeted by enforcement actions. Moreover, holding companies and each of their insured subsidiaries can receive an enforcement action simultaneously.

Enforcement actions differ in their severity and level of enforceability. Informal enforcement actions attempt to persuade banks to take certain actions and, although they main contain quite specific provisions, they are not enforceable in a court of law (Curry et al. (1999)). Very importantly, the supervisor issuing an informal enforcement action is not mandated to make it public and will typically keep it confidential.[1] The confidentiality of informal enforcement actions is in keeping with the confidentiality of the results of on-site examinations and the spirit of much of bank supervisory activity. However, if the problems identified by the on-site examination are severe enough (or if the bank has not complied with previous informal enforcement actions), supervisory agencies may decide or be compelled to issue a formal enforcement action against the bank. Formal enforcement actions are enforceable in court and often carry legal and monetary penalties for non-compliance. Moreover, since FIRREA in 1989 and the Crime Control Act (CCA) of 1990, most formal enforcement actions must be made public by the supervisor.

There are several types of *formal* enforcement actions taken against institutions. Formal *Written Agreements* consist of corrective actions that a financial institution's management and directors must take. These actions are issued with the consent and agreement of the institution and are both the least severe and the most frequent type. *Cease and Desist Orders* (C&D) are issued when the agency requires an entity to change certain practices, to take action to correct violations or practices, and to follow any prescriptions contained in the order. *Civil Money Penalties (CMP)* work as a fine for various types of infractions. In case the firm does not pay the CMP, the party can be subject to criminal penalties. *Prompt Corrective Action Directive (PCA)* enforcement actions correspond to supervisory actions related to the capital level of a bank or thrift institution. The PCA provisions classify insured depository institutions into five categories based on their capital levels. PCAs are applied for capital categories (3) undercapitalized; (4) significantly undercapitalized; and (5) critically undercapitalized. PCAs may also be supplemented by other actions at the supervisor's discretion. Finally, the most severe enforcement actions are the *Termination of Deposit Insurance*, *Appointment of conservator or Receivership*, the *4(m) Agreement*,[2] and *Termination of Membership of the FRB*.

The most severe enforcement actions are very infrequent. The most frequent ones are written agreements consisting of dividend restrictions, debt and stock redemption restrictions, capital levels, inadequate reserves, asset improvement plans, board oversight, liquidity, and funds management, among others (Brown, 2009). In severity, Written Agreements are followed by C&D orders and then Termination of Insurance. While PCAs are initiated when there are severe capital problems, any enforcement action can contain directives to improve and change capital levels. Brunmeier and Willardson (2006) explain that institutions are more likely to sign

[1] In the case of publicly traded banks, securities regulations may require the bank to disclose the informal enforcement action if it is considered material, but there is room for discretion regarding disclosure and the form and timing of such disclosure.

[2] This action is named after section 4(m) of the Bank Holding Company Act, which requires that the Board take corrective action against any financial holding company (FHC) with a depository institution subsidiary that fails to remain well managed or standard capital levels. The Board of Governors **does not disclose** publicly 4(m) Agreements in order to avoid disclosing the institution's management rating.

an Agreement than a C&D order and that the civil money penalties in the last 10 years have increasingly focused on compliance issues. Moreover, the authors find that between 2000 and 2005 written agreements primarily dealt with safety and soundness issues more frequently than C&D orders.

Enforcement actions generally are the result of on-site examinations by the supervisory agencies. If an on-site examination reveals non-compliance with laws and regulations, financial weaknesses, or a potential deviation from safe and sound banking practices, the supervisor may (or may be compelled to) issue an enforcement action against the bank. Following on-site examinations of commercial banks or depository institutions, supervisors rate the adequacy of the institution's Capital, Asset Quality, Management, Earnings, Liquidity and Sensitivity to Market Risk on a scale of 1 to 5. Those ratings are combined to form the composite CAMELS rating ranging from 1 (best) to 5 (worst). A similar procedure is applied to bank holding companies, leading to a rating known as the RFI/C(D).[3] Although obtaining a rating of 4 or worse is not a necessary or sufficient condition for the initiation of an enforcement action, a rating downgrade to 4 or 5 usually triggers a formal enforcement action. Enforcement actions are often applied gradually, with informal actions preceding formal ones (Gilbert and Vaughan (2001), Curry et al. (2003); Brunmeier and Willardson (2006)). Although ratings revisions are closely related to the issuing of enforcement actions, the latter are not an immediate consequence of the former. Brunmeier and Willardson (2006) show that although the factors leading to lower satisfactory ratings and those producing enforcement actions against institutions are positively correlated, there is a lag, since actions are taken when examination results are final and can take considerable time to write, negotiate, and execute. The lag reported by the authors is of approximately one year. In the same line, Brown (2009) argue a spike in the number of enforcement actions released by the Federal Agencies during 2009-2010 as a consequence of the recent crisis started in 2007-2008.

In this paper, we analyze the enforcement actions issued by the four main federal banking agencies: the Federal Reserve System (FRB), the Federal Deposit Insurance Corporation (FDIC), the Office of the Comptroller of the Currency (OCC), and the Office of Thrift Supervision (OTS).

5.2 Data

5.2.1 Sample selection

The sample selection process is the same as in Chapter 2 of this dissertation. We first select all firms with 4-digit SIC codes between 6000 and 6300 covered by the compensation database Execucomp and whose CEO is identified in this database in year 2006. Of the 167 firms so selected, we keep all firms with SIC codes 6020 (*Commercial Banks*), 6035 (*Savings Institutions, Federally Chartered*), and 6036 (*Savings Institutions, Not Federally Chartered*)—a total of 114 firms—and we exclude firms with SIC codes 6111 (*Federal Credit Agencies*) and 6282 (*Investment Advice*). To determine the inclusion of the 41 firms in the remaining SIC codes, we search the National Information Center of the Federal Financial Institutions Examination Council (FFIEC)

[3] RFI/C(D) ratings replaced the BOPEC ratings used until 2004.

to verify each firm's institution type in year 2006.[4] We keep a firm in the sample firm if it is identified as any type of regulated institution.[5] We also keep in the sample those firms listed as primary dealers by the New York FED. This process yields a base sample of 130 firms in 2006, but we have to drop one (Center Financial Corp) because it does not match with Compustat Fundamentals. Therefore, our final sample has 129 firms. These firms are either single standing commercial banks, Bank Holding Companies (BHCs), or Financial Holding Companies (FHCs). For some of our specifications, we focus on the subsample of banks with SIC codes 6020, 6035, and 6036, since for these banks we have additional information.

5.2.2 Enforcement actions

A large number of the firms included in the sample are BHCs or FHCs. In such types of firms, supervisors are entitled to issue enforcement actions against either the holding company itself and/or one or more of its depository subsidiaries.[6] To account for every enforcement action, we unfold each holding company into its regulated subsidiaries using the FDIC Institution Directory.[7]

We match our sample with the information provided by the FDIC for regulated top holders and their corresponding insured subsidiaries and cross-check with the information provided on-line by the FFIEC.[8] For each of the firms in the original sample of 129 firms, we manually check the names of the subsidiaries that correspond to any form of regulated institution by the FED, FDIC, OCC and OTS. We then match this final sample of banks' and subsidiaries' names with the data set of enforcement actions. We perform the merger of the holding companies and their subsidiaries using the RSSDID of each firm.

We construct a dummy variable, EA_{it}, which is equal to one if firm i (or any insured subsidiary) receives one or more firm-level enforcement actions related to solvency and soundness in year t, for t in the financial crisis period, which we define as the period from 2007 to 2010. To date the crisis, we follow the time-lines provided by the New York Fed (which dates the beginning of the "financial turmoil" in June 2007)[9] and the Saint Louis Fed (which dates the beginning of the financial crisis in February 2007).[10] and define 2007 to be the first year of the financial crisis.

[4]These firms have SIC codes: 6099 (*Functions Rel. To Dep. Bkg.*), 6141 (*Personal Credit Institutions*), 6153 (*Short-Term Business Credit*), 6159 (*Misc Business Credit Instn*), 6162 (*Mortgage Bankers & Loan Corr*), 6172 (*Finance Lessors*), 6199 (*Finance Services*), 6200 (*Security & Commodity Brokers*), 6211 (*Security Brokers & Dealers*). We access the National Information Center of the FFIEC at `http://www.ffiec.gov/nicpubweb/nicweb/SearchForm.aspx`.

[5]The classes of regulated institutions are: financial holding company, bank holding company, savings and loans holding company, federal savings bank, national bank, state member bank, FDIC-insured non-member bank, federal savings association.

[6]For example, Bank of America is a FHC with several insured subsidiaries. If an on-site examination of an insured subsidiary results in soundness or solvency concerns, the FDIC can start actions against the subsidiary and, at the same time, the FED can prompt actions against the holding company.

[7]`http://www.ffiec.gov/nicpubweb/nicweb/SearchForm.aspx`

[8]The FDIC defines *Regulatory top holder* as any company that directly or indirectly owns, controls or has power to vote 25 percent or more of a bank's or direct holding company's shares or controls in any manner the election of a majority of the directors or trustees of a bank or direct holding company or exercises a controlling influence over the management or policies of a bank or direct holding company. Information on Thrift Holding Companies that own Savings Associations but do not own banks is not currently available in the ID System. Source: Federal Reserve Board National Information Center data base.

[9]`http://www.ny.frb.org/research/global_economy/Crisis_Timeline.pdf` (last accessed on October 17, 2013).

[10]`http://timeline.stlouisfed.org/index.cfm?p=timeline` (last accessed on October 17, 2013).

To determine whether a bank holding company or depository subsidiary receives a risk related enforcement action during the financial crisis, we access the websites of the different federal bank supervisors and build a data set that contains all the enforcement actions issued from January 2007 to December 2010. We then manually match the data set of enforcement actions with our extended sample of 129 firms and all their insured subsidiaries and download the text of each matched enforcement action. By reading the text of each enforcement action, we identify whether the enforcement action is related to issues or risk, solvency, or soundness. Thus, we do not consider civil money penalties as risk-related enforcement actions, because in our sample they apply to non-compliance issues not directly related to solvency. Of the remaining C&D Orders and Written Agreements, we disregard those that are clearly not related to risk. In Appendix 5.7.2, we report the enforcement actions issued against the firms in the sample and whether they could be considered risk related. We also provide examples that illustrate how we determine whether enforcement actions are risk related from their texts.

As we describe in detail below, several banks disappear as independent entities during the financial crisis. The definition of EA_{it} implies that if a bank disappears in year t and the bank did not receive an enforcement action in year t, then $EA_{it} = 0$. However, it is not clear that one should assign a value of zero to a bank that lives only part of the year, since supervisors have less time during the year to issue an enforcement action against the bank. In the limiting case in which a bank closes at the beginning of the year, it is not possible or extremely unlikely that supervisors can issue an enforcement action in the year. Therefore, for robustness, we also define a dummy variable that is not defined (i.e., defined to be missing) for a year in which firm i fails and $EA_{it} = 0$. We also define a dummy variable, EA_i, that takes the value 1 if firm i receives an enforcement action during the crisis period and is zero otherwise.

Figure 5.1 graphs the evolution of the number of enforcement actions and the number of the types of enforcement actions that we consider in our analysis for the population of regulated institutions. Figure 5.2 graphs the same variables for the firms in our sample. From both graphs, one can see that whereas the number of enforcement actions is relatively low and stable in the period 1995-2006 (with a dip in the second half of the 1990s) and does not experience a large change in 2007, both the total number of enforcement actions as well as those that are risk related (in the case of our sample) or potentially risk related (in the case of the whole population of regulated institutions) increase dramatically in the years 2008-2010. As Figure 5.1 shows, the number of enforcement actions in these years greatly surpasses the number of enforcement actions during the Savings & Loans crisis in the early 1990s.

5.3 Enforcement Actions and Bank Size

As a first step to evaluating the relation between bank size and the incidence of enforcement actions, we order the firms of the sample by size (measured as the natural logarithm of total assets as of December 2006) and divide the sample by size into 13 groups of 10 firms each (except for the top group, which has only 9 firms). In Table 5.5 we display the number of formal enforcement actions by size group. Strikingly, of the fifteen firms in our sample that receive at least one risk-related enforcement action during the crisis period, not a single one is in the top four size groups (i.e., the top 39 firms by total assets).

To investigate whether the absence of enforcement actions among the largest firms is due to the fact that they are less risky, we estimate a simple linear probability model to predict the issuance of a formal enforcement action. In the model, we include as regressors variables that previous papers have found to be predictive of supervisory ratings changes (as well as a subsample of

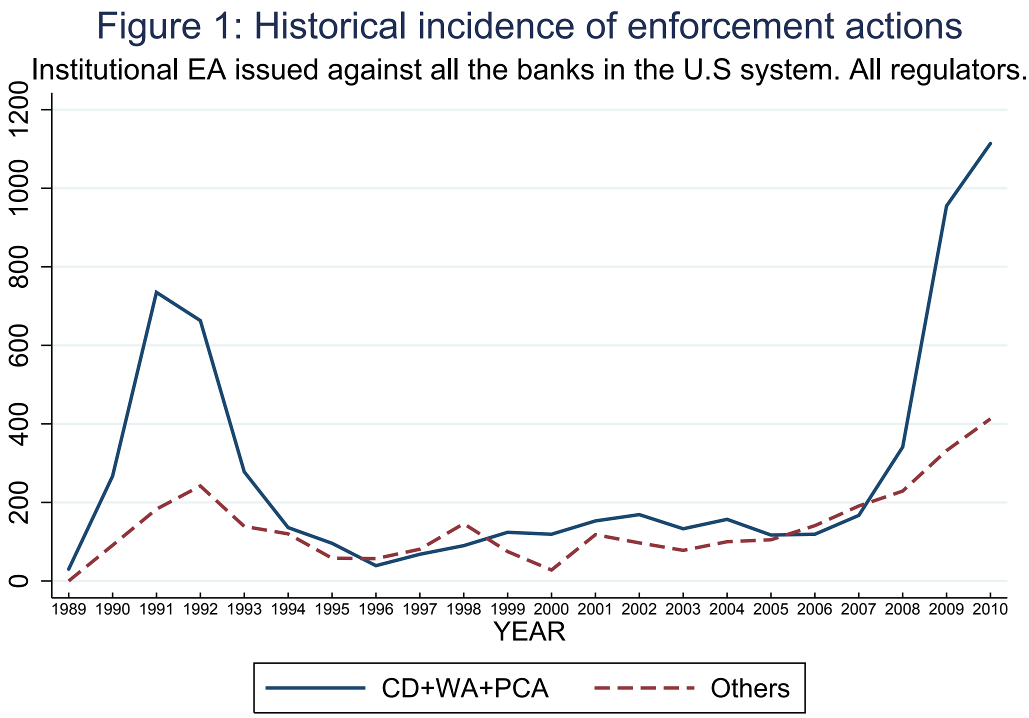

Figure 5.1

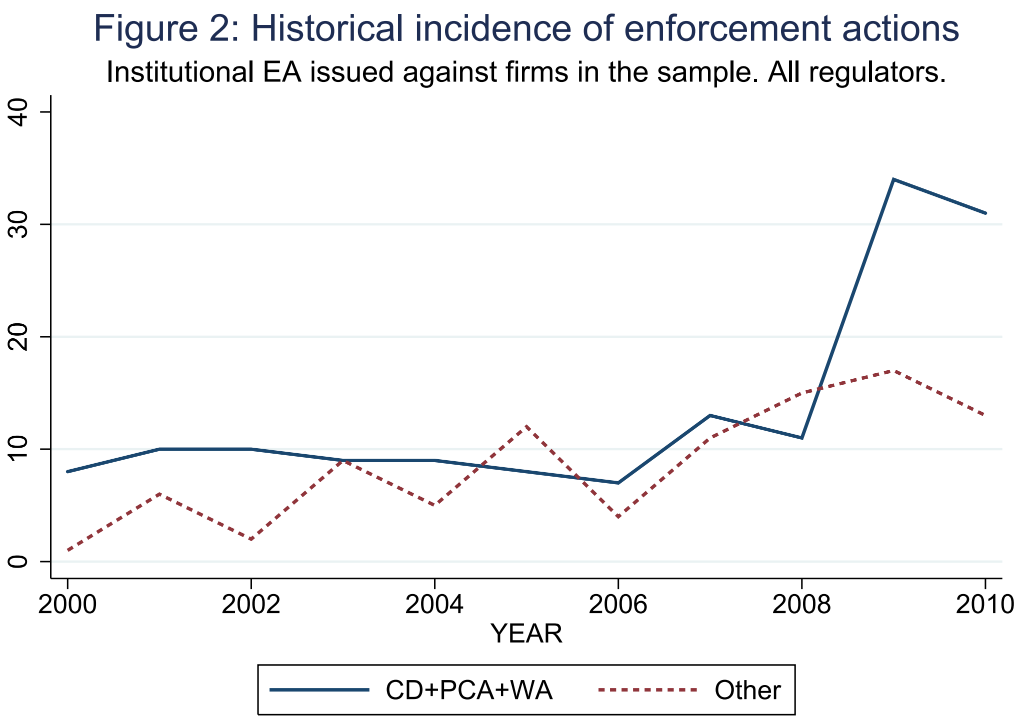

Figure 5.2

the regressors used by Peek and Rosengren (1997) to predict formal enforcement actions issued against New England banks in the period 1989-1992). More concretely, we estimate the following model:

$$EA_{it} = \alpha + \beta \mathbf{size_{it-1}} + \gamma \mathbf{x_{it-1}} + \varepsilon_{it}, \tag{5.1}$$

where **size** is a vector (possibly with just one component) of size measures and **x** is a vector of controls, which contains ROA (defined as the ratio of operating income before depreciation scaled by total assets at the beginning of the year) and leverage (defined as the book value of total debt over total assets) For the subsample of banks in SIC codes 6020, 6035, and 6036, we have additional information, so we also use as controls the Tier capital 1 ratio (Tier 1) and the ratio of non-performing loans to total assets (NPA).

Before presenting the estimation results, Panel A of Table 5.6 presents summary statistics of the different variables and Panel A of Table 5.7 the table of simple correlations. We obtain all variables from Compustat Annual Fundamentals. When interpreting the summary statistics, it is important to keep in mind that the financial condition of the banks in the sample changes substantially over the sample period and that there is significant attrition (21 banks disappear as independent entities between 2007 and 2010). To shed more light on the distribution of the relevant variables, in panels B and C of tables 5.6 and 5.7 we also report summary statistics and correlations for the first (2007) and last (2010) years of the crisis period. As the tables of summary statistics highlight, the banks in the sample are very large and the size distribution, even within this tranche of the size distribution of banks, is highly skewed. Thus, whereas the median assets are $ 13.3 billion, the top twelve banks have assets larger than $ 225 billion. Table 5.7shows that bank size is positively correlated with both leverage and ROA and negatively correlated at the beginning of the crisis with NPA.

Table 5.8 shows the results of estimating equation 5.1 with different size measures. In the first two columns we include size (measured as total assets) linearly and with a quadratic term, and in the third column we measure size as the natural logarithm of total assets. In all three cases, the probability of receiving an enforcement action is decreasing in bank size, although the coefficients are not statistically significant at conventional levels for the quadratic specification (in all cases, standard errors are robust and clustered by firm). Instead of including size parametrically, in the fourth and fifth columns we use five size dummies corresponding to each size quintile (with quintile 5, being the quintile with the largest firms, and quintile 1 being the omitted category). The probability of receiving an enforcement action is significantly lower for the two top quintiles than for the bottom quintile. Further, Wald tests of equality of coefficients reveal that the coefficients for both the top quintile and the fourth quintiles are also significantly larger than that for the second lowest quintile. Columns 5 and 6 present the results for the alternative definition of the enforcement action dummy (which disregards observations of firms that fail in year t and do not receive an enforcement that year). The coefficient estimates and their statistical significance are virtually unchanged relative to those obtained with EA_{it}. Therefore, the results are in line with the unconditional results reported in Table 5.5: Banks in the top two quintiles are significantly less likely to receive an enforcement action.

5.4 Bank Size, Enforcement Actions, and Bank Failure

The results in the previous section could be explained by larger banks being more diversified or better at risk management, which would allow them to be less risky than smaller banks for given levels of leverage or return on assets. To check whether firms in the sample differ in their riskiness, we also construct a dummy variable, called *Failed*, which indicates whether a firm fails during the period from 2007 to 2010. Since many of the banks in our sample are likely to be systemically important, bank supervisors may intervene to support them if there is risk of insolvency. Therefore, if we defined bank failure narrowly to include only those banks that are formally closed, we would run the risk of underestimating the riskiness of systemic institutions. Instead, we define bank failure in an encompassing way: We consider a bank failed if it is closed, put into receivership with FDIC intervention, or sold to another company while in trouble under the supervision and recommendation of regulators during the period 2007-2010. To construct this variable and identify a firm in the sample as "failed", for each of the firms in our sample we follow the procedure described in Chapter 2 of the dissertation. In particular, we manually check the firm's history records at the FFIEC website, the information at the FDIC website, and the news media. If a firm disappears as an independent entity during the 2007-2010 period because of a merger or acquisition of strategic nature, we do not consider the firm failed for our purposes and leave the dummy equal to zero. See the appendix for Chapter 2 for a list of banks that fail in the 2007-2010 period.

We first note that the set of failed banks does not coincide with the set of banks that receive an enforcement action. On the contrary, Table 5.4 shows that, even though firms that are the subject of an enforcement action during the financial crisis are more likely to close subsequently, only 31.2% of firms subject to an enforcement action fail, whereas 15.31% of firms that are not the subject of an enforcement action fail. Put differently, a large fraction (75%) of the banks that fail during the crisis do not receive a prior enforcement action in the crisis period.

Table 5.9 is the analog to Table 5.5 and reports the incidence of bank failure for different quantiles of bank size. For ease of comparison, we duplicate the numbers of Table 5.5. The difference between the two tables is stark: Whereas none of the sixteen firms that receive an enforcement action is among the top forty banks, eight of the twenty-one failed firms is in this group of banks and seven out of the top twenty banks fail during the crisis. Therefore, it does not appear as if the largest banks were less likely to fail than smaller banks. The regression results reported in columns 1 to 4 of Table 5.10 also show that, conditional on predictors of bank failure, such as leverage or ROA, the very large banks were not less likely to fail than smaller banks. In fact, there is no statistically significant relation between size and failure probability in the sample.

However, if enforcement actions have the intended effect of forcing banks to implement policies to reduce their risk, then large banks could be less risky ex ante, yet, at the same time, the very fact that they are less likely to receive formal enforcement actions could explain that they do not fail less frequently than smaller banks. To control for this possibility, we also include dummies to capture whether a bank receives an enforcement action the current or past crisis years (EAPC) or in past crisis years (EAP). As we report in columns 5 and 6 of Table 5.10, the coefficients for these dummies are positive, large, and highly statistically significant. The large, positive sign indicates that our controls have only limited explanatory power in explaining failure, so that the issuance of a formal enforcement action against a firm is highly informative about the firm's weak condition. This information greatly outweighs the possible positive causal effect on a firm's financial condition of the issuance of an enforcement action. In any case, including the dummies for the issuance of a formal enforcement action does not alter the result that size is not associated with the probability of failure.

5.5 Robustness Checks

As explained in 5.2, the sample of 129 firms consists of bank and financial holding companies that control insured depository institutions. However, commercial banking may not have been the main activity for some of these holding companies, especially the financial holding companies, so that their depository institutions may have received less supervisory attention. At the same time, these holding companies with a large fraction of their activity outside banking include some of the largest and riskiest institutions in the sample (such as, say, Bear Sterns of Lehman Brothers). Therefore, we re-estimate our main specifications restricting the sample to the most bank-centered subset of holding companies, in particular those with SIC codes 6020, 6035, and 6035. Moreover, for this subsample of financial institutions we have additional information, such as the Tier 1 capital ratio and the fraction of non-performing assets, which we can include as controls in our regressions. Table 5.11 displays the number banks that fail or receive a formal enforcement action by size group for the subsample of banks with SIC codes 6020, 6035, and 6035. As in the full sample, firms in the top quantiles by size do not receive any enforcement action, whereas they do not seem to be substantially less likely to fail. In Table 5.12 we report the results of the linear probability model of the probability of receiving an enforcement action and of failing, estimated for the subsample of firms with SIC codes 6020, 6035, and 6035. In these specifications, in addition to Leverage and ROA, we include as regressors the ratio of non-performing assets to total assets (NPA) and the Tier 1 capital ratio (Tier 1). As in the case of the full sample, the probability of receiving an enforcement action is significantly lower for the top quintile (and for the second to top in some specifications) than for the bottom quintile. Further, Wald tests of equality of coefficients reveal that the coefficient for the top quintile is also significantly larger than that for the second lowest quintile. At the same time, the probability of failure is not associated with firm size.

Since the division of banks into size quintiles is, to some extent, arbitrary, for robustness we re-estimate the enforcement action and failure equations using size quartiles instead of quintiles. As we show in Table 5.13 (both for the whole sample and for the bank subsample), the probability of receiving an enforcement action is significantly lower for the top quartile of firms, whereas the probability of failure is not related to size.

An additional concern with our results is that, as reported by Brunmeier and Willardson (2006), there is a lag of up to a year between an on-site examination and the issuance and disclosure of a formal enforcement action. Therefore, the relevant information in predicting an enforcement action may not be that of the year immediately preceding the enforcement action, but that of two years before the issuance of the enforcement action. Moreover, in some instances, there is no available information for the year prior to firm failure or the issuance of an enforcement action (typically because firms fail to file their quarterly or annual reports in time). To check the robustness of our results we, thus, also estimate our main specification with size and other regressors lagged two periods. As Table 5.14 shows, the results change little when regressors are lagged two years.

5.6 Conclusion

In this paper, we show that federal bank supervisors appear to practice greater regulatory forbearance with the very large financial institutions in relation to the issuance of formal enforcement actions. These very large banks appear to be "too big to discipline" by means of formal enforcement actions. Our results suggest that the lack of enforcement actions against very large financial institutions during the financial crisis is not due to their being less risky. In contrast to the results we obtain for enforcement actions, very large banks do not have a lower propensity to fail than smaller, yet still large, banks.

There are several possible interpretations of our results. First, it is possible that supervisors' regulatory forbearance towards the very large banks is optimal, both ex post (that is, in the event of a situation of financial instability) and ex ante (that is, even taking into account its potential negative effect on large banks' incentives to take on risk). Second, the policy of abstaining from issuing formal enforcement actions against large banks could be optimal ex post, yet not be optimal ex ante, because the perverse incentives to take on risk that it generates outweigh the ex post benefits in times of financial distress. Finally, this policy could be suboptimal even ex post and motivated either by regulators' excessive caution in relation to large institutions or by regulatory capture. Further research is needed to tease out these potential explanations for our results.

5.7 Appendix

5.7.1 Variable definition

EA: Dummy equal to 1 if the firm has received and enforcement action in the year 2007 - 2010

EA_{it}**:** Dummy equal to 1 if the firm i has received a solvency related enforcement action in year t, and zero otherwise.

$EA_{it}N$**:** Dummy equal to 1 if the firm i has received a solvency related enforcement action in year t, missing if the firm has closed that year and has not received any EA_{it}, zero in all remaining cases.

F: Dummy equal to 1 if the firm has failed in the period 2007 - 2010.

F_{it}**:** Dummy equal to 1 if the firm i has failed and closed by intervention of a federal regulator in year t.

Leverage: Book value of leverage ratio computed as the ratio of debt (short term and long term) to total assets ($Leverage = (dltt + dlc)/at$).

logSize: Natural Logaright of total assets as reportes in Compustat ($logSize = log(at)$)

NPA: Non-performing assets ratio is the ratio of the total amount of non-performing assest scaled by total assets ($NPA = npat/at$)

ROA: Return on Assets is the ratio of operating income before depreciation scaled by total assets at the begining of the year. ($ROA = oibdp/at[\_n - 1]$)

Size: Size is the total assets of the firm measured in trillion dollars. ($Size = at/1000000$)

Size_sq: Size squared.

SizeQ5: Categorical variable with values from 1 to 5 indicating the quintile of Size of the firm in year t.

SizeQ4: Categorical variable with values from 1 to 5 indicating the quartile of Size of the firm in year t.

Tier1: Tier 1 capital ratio as reported in Compustat annual (capr1).

5.7.2 Enforcement Actions

5.7.2.1 Examples of Enforcement Actions

Example of a C&D text that is classified as risk related: Anchor Bankcorp (2009)

" [...]NOW, THEREFORE, IT IS ORDERED that:

1. The Association and its directors, officers, and employees shall cease and desist from any action (alone or with others) for or toward causing, bringing about, participating in or counseling all unsafe or unsound practices that resulted in the Association operating at a loss, with a large volume of adversely classified assets, and with an inadequate level of capital for the kind and quality of assets held.

Capital

2. (a) No later than September 30, 2009, the Association shall achieve and maintain: (i) a Tier 1 (Core) Capital Ratio of at least seven percent (7%) and (ii) a Total Risk-Based Capital Ratio of at least eleven percent (11%) after the funding of an adequate Allowance for Loan and Lease Losses (ALLL).

(b) No later than December 31, 2009, the Association shall achieve and maintain: (i) a Tier 1 (Core) Capital Ratio of at least eight percent (8%) and (ii) a Total Risk-Based Capital Ratio of at least twelve percent (12%) after the funding of an adequate ALLL.

(c) Effective immediately, the Board shall review the Association's capital levels at each regular monthly Board meeting and ensure that the Association continually assesses the sufficiency of the Association's capital levels relative to its risk profile, including but not limited to, such risks as: classified asset levels, non accrual loans, and core earnings. The trends in such risks shall also be reviewed and monitored by the Board. The Board's review of capital adequacy and any actions to be taken to ensure that adequate capital levels are maintained shall be fully detailed in the Board meeting minutes.[...]"

Example of a C&D text that is NOT considered Risk related: WAMU (2007)

"[...] NOW, THEREFORE, IT IS ORDERED THAT:
I. ORDER TO CEASE AND DESIST

A. The Institution and its directors, officers, employees, and agents shall cease and desist from any action (alone or with another or others) for or toward causing, bringing about, participating in, counseling, or aiding and abetting any violation of:

(1) The Currency and Foreign Transactions Reporting Act (the Bank Secrecy Act or BSA), 31 U.S.C. §§ 5311 et seq., and the related BSA regulations issued by the United States Department of the Treasury, 31 C.F.R. Part 103, and the OTS, 12 C.F.R. § 563.177; and

(2) The OTS regulations governing suspicious activity reports (SARs) set forth in 12 C.F.R. § 563.180 (the SAR Regulation).[...]"

When the C&D section is not explicitly related to risk or capital issues we complement the reading of the C&D section with a search of four key words: capital, liquidity, solvency and risk. If, the reading of the section *I* and the search of key words gives no results, then the action is *not* classified as a Risk related action.

Example of a WA text that is considered Risk related: Flagstar2010a

"[...] WHEREAS, based on its August 3, 2009 examination of the Holding Company, the OTS finds that the Holding Company has engaged in unsafe or unsound practices in conducting its consolidated operations;

Capital Plan

1. (a) Within forty-five (45) days, the Holding Company shall submit to the Regional Director an acceptable written plan for enhancing the consolidated capital and earnings of the Holding Company (Capital Plan). The Capital Plan shall cover the period beginning with the quarter starting January 1, 2010 through the quarter ending December 31, 2011.

At a minimum, the Capital Plan shall include:

(i) establishment of a minimum tangible capital ratio of tangible equity capital to total tangible assets commensurate with the Holding Company's consolidated risk profile;

(ii) specific plans to ensure conformance with the Business Plan of the Holding Company's wholly-owned savings association subsidiary, Flagstar Bank, FSB, Troy, Michigan, OTS Docket No. 08412 (Association), including capital levels projected by the Association;

(iii) operating strategies to achieve net income levels that will result in profitability and adequate debt service throughout the term of the Capital Plan; [...]

Another example is the cases in whch the WA or CO is issued against the holding company claiming it as source of strength for the subsidiary and followed by a Capital plan: Cascade 2009

"[...]WHEREAS, it is the common goal of Bancorp, the Federal Reserve Bank of San Francisco (the Reserve Bank), and the Director of the State of Oregon's Department of Consumer and Business Services acting through the Administrator of the Division of Finance and Corporate Securities (the DFCS) to maintain the financial soundness of Bancorp so that Bancorp may serve as a source of strength to the Bank;[...]
"[...] Capital Plan

3. Within 60 days of this Agreement, Bancorp shall submit to the Reserve Bank an acceptable written plan to maintain sufficient capital at Bancorp, on a consolidated basis, and at the Bank, as a separate legal entity on a stand-alone basis. The plan shall, at a minimum, address, consider, and include:

(a) The consolidated organization and the Bank's current and future capital requirements, including compliance with the Capital Adequacy Guidelines for Bank Holding Companies: Risk-Based Measure and Tier 1 Leverage Measure, Appendices A and D of [Page Break] Regulation Y of the Board of Governors (12 C.F.R. Part 225, App. A and D), and the applicable capital adequacy guidelines for the Bank issued by the Bank's federal regulator;

(b) the adequacy of the Bank's capital, taking into account the volume of classified credits, concentrations of credit, allowance for loan and lease losses ("ALLL"), current and projected asset growth, and projected retained earnings;

(c) the source and timing of additional necessary funds to fulfill the consolidated organization's and the Bank's future capital requirements;

(d) supervisory requests for additional capital at the Bank or the requirements of any supervisory action imposed on the Bank by its federal or state regulator; and

(e) the requirements of section 225.4(a) of Regulation Y of the Board of Governors (12 C.F.R. § 225.4(a)) that Bancorp serve as a source of strength to the Bank.

4. Bancorp shall notify the Reserve Bank, in writing, no more than 30 days after the end of any quarter in which any of the consolidated organization's or the Bank's capital ratios (total risk-based, Tier 1, or leverage) fall below the approved plan's minimum ratios. Together with the notification, Bancorp shall submit an acceptable capital plan that details the steps Bancorp *will take to increase the consolidated organization's or the Bank's capital ratios to or above the approved plan's minimums.[...]"*

Example of a WA text that is NOT considered Risk related: Bank of America 2010

"[...]WHEREAS, the U.S. Department of Justice, Antitrust Division, the U.S. Securities and Exchange Commission, the Office of the Comptroller of the Currency, the Internal Revenue Service, and the Federal Reserve Bank of Richmond (the "Reserve Bank") (collectively, "the Agencies") conducted investigations and examinations concerning various types of anti-competitive activities at Bank of America by certain employees in conjunction with the sale of certain derivative financial products to municipalities and other non-profit organizations variously between the years 1998 and 2003;[...]"

Usually, this cases have no results in a search of four key words: capital, liquidity, solvency and risk.

Civil Money Penalties Example : Northern Trust (2008)

"[...]WHEREAS, the Comptroller of the Currency of the United States of America ("Comptroller") intends to initiate a civil money penalty proceeding against Northern Trust, N.A., Miami, Florida ("Bank"), pursuant to 42 U.S.C. § 4012a(f), based on the Bank's pattern or practice of making, increasing, extending or renewing loans secured by property located in a special flood hazard area for which flood insurance is available under the National Flood Insurance Act, without requiring the property securing the loans to be covered by the requisite flood insurance.[...]"

In all cases, a word search for capital, liquidity, solvency and risk found no matches.

5.7.2.2 Cases

5.7.2.2 Civil Money Penalties

We have disregarded every CMP case on the grounds that all the matches were related to compliance issues.

5.7.2.2 Written agreements, cease and desist orders and prompt corrective actions

Prompt corrective actions are related to capital requirements by definition of the action itself, so all cases were included. For Cease and Desist Orders and Written Agreements we show in the following tables the cases included and excluded, depending of whether they were related to risk, capital or solvency.

Table 5.1: List of firms in the sample that have received a Civil Money Penalty during the crisis period (2007-2010). All cases were related to compliance and not to solvency, liquidity, risk or capital. Column *Cause* gives details about the compliance issues.

Civil Money Penalty

Company	**Cause**
AMEX (2009)	Violations of section 5 of the Federal Trade Commission Act, 15 U.S.C. § 45(a)(1) ("Section 5").
AMEX (2009)	Violations of section 5 of the Federal Trade Commission Act, 15 U.S.C. § 45(a)(1) ("Section 5").
Associated (2007)	Flood Act Insurance.
Banco Popular (2008)	No details.
Capital One	No details.
Cascade (2008)	Flood insurance compliance.
Cathay (2008)	Flood insurance compliance.
City National (2008)	Flood insurance compliance.
Compass	Flood insurance compliance.
East West (2007)	Flood insurance compliance.
First Horizon (2007)	Flood insurance compliance.
First Tenesee (2009)	Resulting in violations of appraisal regulations under 12 C.F.R. Part 34.
Glacier (Citizens) (2010)	Flood insurance compliance.
Hanmi (2007)	Flood insurance compliance.
Keybank (Keycorp) (2007)	Flood insurance compliance.
Northern Trust	Flood insurance compliance.
Regions (2009)	Flood insurance compliance.
State Street (2010)	Flood insurance compliance.
Sterling (2009)	Flood insurance compliance.
Trustco (2010)	Flood insurance compliance.
Umpqua (2008)	Flood insurance compliance.
United (2008)	Flood insurance compliance.
United (2009)	Flood insurance compliance.
Wachovia (2008)	Unfair commercial behavior.
Wachovia (2010)	Bank secrecy and money laundering compliance.
WAMU	Flood act compliance.
Webster (2007)	Flood insurance compliance.
Wells Fargo (2008)	No details.
Wells Fargo (2009a)	Flood insurance compliance.
Wells Fargo (2009b)	Flood insurance compliance.

Table 5.2: List of firms in the sample that have received a Cease and Desist order, a Written Agreement or a Prompt Corrective Action in the crisis period (2007-2010) that were classified as being related to solvency, liquidity, risk or capital and used in our study.

Actions related to risk, solvency or capital.

Company	**CD**	**WA and CMP**
Anchor (2009)	1	1
Cascade (2009)	1	1
Central Pacific (2010)		1
CIT (2009)	1	1
Citizens (Glacier)(2008)	1	
Corus (2009)	1	1
Downey (2008)	1	
First Bancorp (2010)		1
First Midwest (2009)	1	
Firstfed (2009)	1	
Flagstar (2010)		1
Franklin (2008)	1	
Hanmi (2009)		1
Irwin (2008)	1	1
Prosperity (2010)		1
Sterling (2009)	1	1
United Bank (2010)	1	

Table 5.3: List of firms in the sample that have received a Cease and Desist order, or a Written Agreement in the crisis period (2007-2010) that were classified as not related to solvency, liquidity, risk or capital and excluded in our study.

Excluded enforcement actions

Company	**CD**	**WA**
Amex (2009)	1	
Amex (2009b)	1	
Brookline (2009)	1	
SLM (2008)	1	
TCF (2010)	1	
Wachovia (2010)	1	
WAMU (2007)	1	
Washington Federal	1	
American Express (2010)		1
Bank of America (2010) OCC		1
Bank of America (2010)		1
Capital One (2010)		1
Wachovia (2008a)		1
Wachovia (2008b)		1

Table 5.4: Enforcement actions and bank closures in the sample.
This table shows the cross tabulation of the incidence of enforcement actions and closure. Closure is a categorical variable equal to 1 if the firm has been closed or sold with intervention from the federal regulators in the period 2007-2010 and zero otherwise. Enforcement action is a categorical variable equal to 1 if the supervisors have issued at least 1 enforcement action in the period 2007-2010 and zero otherwise.

	Not Failed	Failed	Total
No enforcement Action	98	15	113
Enforcement Action	11	5	16
Total	109	20	129

5.7.3 Tables

Table 5.5: Distribution of EAs Distribution by size bins of firms receiving and not receiving enforcement action during the crisis period (2007- 2010). Size is measured as total assets at the end of year 2006. Bin 1 contains the smallest firms in the sample and bin 13 the largest.

		Number of firms	
Bin	Total Firms	EA=0	EA=1
1	10	8	2
2	10	10	0
3	10	6	4
4	10	7	3
5	10	8	2
6	10	8	2
7	10	10	0
8	10	7	3
9	10	10	0
10	10	10	0
11	10	10	0
12	10	10	0
13	9	9	0
Total	129	113	16

Table 5.6: Firm characteristics: summary statistics. Size is the firm's total assets measured in trillion dollars. Leverage is the book-value ratio of debt to assets. NPA is the ratio of non performing assets scaled by total assets. ROA is the ratio of operating income before depreciation scaled by total assets lagged one year. Tier 1 is the capital asset ratio for banks. EA_{it} is a dummy equal to 1 in the year the firm receives an enforcement action related to capital or solvency. F_{it} is a dummy equal to 1 if the firm is closed by regulatory intervention in year t. Panel A displays summary statistics for the entire sample period (2007-2010). Panel B displays characteristics for the first crisis year (2007) and Panel C displays summary statistics for the surviving firms in 2010.

Panel A: Years 2007 - 2010

	Count	Mean	S.D.	p10	p50	p90
Size	421	0.13	0.37	0	0.01	0.2
Leverage	416	0.18	0.12	0.05	0.16	0.33
ROA	441	0.02	0.02	-0.01	0.02	0.03
NPA	375	0.02	0.03	0	0.01	0.05
Tier1	391	10.96	3.27	7.06	10.76	14.4

Panel B: Year 2007

	Count	Mean	S.D.	p10	p50	p90
Size	119	0.13	0.34	0	0.01	0.24
Leverage	118	0.22	0.14	0.05	0.19	0.41
ROA	121	0.03	0.01	0.01	0.02	0.04
NPA	104	0.01	0.01	0	0.01	0.02
Tier1	106	9.73	2.61	6.94	9.45	12.17

Panel C: Year 2010

	Count	Mean	S.D.	p10	p50	p90
Size	97	0.13	0.4	0	0.01	0.2
Leverage	96	0.15	0.11	0.04	0.12	0.29
ROA	99	0.01	0.02	-0.01	0.02	0.03
NPA	87	0.03	0.02	0	0.02	0.06
Tier1	89	12.4	3.64	7.95	12.44	17.01

Table 5.7: Firm characteristics: correlation table. Size is the firm's total assets measured in trillion dollars. Leverage is the book-value ratio of debt to assets. NPA is the ratio of non performing assets scaled by total assets. ROA is the ratio of operating income before depreciation scaled by total assets lagged one year. Tier 1 is the capital asset ratio for banks. EA_{it} is a dummy equal to 1 in the year the firm receives an enforcement action related to capital or solvency. F_{it} is a dummy equal to 1 if the firm is closed by regulatory intervention during year t. Panel A displays pairwise correlation coefficients for the period (2007-2010). Panel B displays pairwise correlation coefficients for the first crisis year (2007) and Panel C displays pairwise correlation coefficients for the surviving firms in 2010.

Panel A: Years 2007 - 2010

	Size	Leverage	ROA	NPA	Tier 1	Fit
Size	1					
Leverage	0.4283	1				
ROA	0.1418	0.146	1			
NPA	-0.0657	-0.0577	-0.7371	1		
Tier1	-0.1062	-0.332	0.1943	-0.1739	1	
Fit	0.0435	0.2087	-0.1994	0.3602	-0.1978	1
EAit	-0.0634	0.0158	-0.2516	0.3494	-0.0753	0.1908

Panel B: Year 2007

	Size	Leverage	ROA	NPA	Tier 1	Fit
Size	1					
Leverage	0.4562	1				
ROA	0.3048	0.2895	1			
NPA	-0.0748	0.1741	-0.2466	1		
Tier1	-0.2167	-0.3943	0.2595	-0.1003	1	
Fit	-0.0214	-0.0318	0.2484	-0.1097	0.1085	1

Panel C: Year 2010

	Size	Leverage	ROA	NPA	Tier 1	Fit
Size	1					
Leverage	0.4621	1				
ROA	0.1255	0.0788	1			
NPA	-0.1118	0.0301	-0.8086	1		
Tier1	-0.0642	-0.2327	0.4356	-0.508	1	
Fit	-0.0444	-0.0591	-0.4985	0.5122	-0.2482	1
EAit	-0.0693	0.0495	-0.1058	0.2057	-0.0962	-0.0331

Table 5.8: Firm Size and the Probability of Receiving an Enforcement Action: Regression Results. EA_{it} is a dummy variable equal to 1 if the firm i has received an enforcement action in year t and zero otherwise. $EA_{it}N$ is a dummy variable equal to 1 if the firm i has received an enforcement action in year t, missing if the firm has failed in year t but has not received and enforcement action that year, and zero otherwise. Size is the firm's total assets measured in trillion dollars. logSize is the natural logarithm of total assets. Leverage is the book-value ratio of debt to assets. ROA is the ratio of operating income before depreciation scaled by total assets lagged one year. Q2, Q3, Q4, Q5 are dummy variables for quintiles of size 2, 3, 4, and 5 respectively by year. All independent variables are lagged one period. All standard errors are clustered at the firm level. *, ** and *** represent significance levels at 10%, 5% and 1% respectively. Robust standard errors in parentheses.

	(1) EA_{it}	(2) EA_{it}	(3) EA_{it}	(4) EA_{it}	(5) $EA_{it}N$	(6) $EA_{it}N$
L.Size	-0.0336^{***}					
	(0.013)					
L.logSize		-0.0159^{***}				
		(0.005)				
L.Leverage	0.1162^{*}	0.1823^{**}	0.1569^{**}	0.1470^{**}	0.1747^{**}	0.1624^{**}
	(0.067)	(0.076)	(0.064)	(0.062)	(0.074)	(0.072)
L.ROA	-2.4630^{***}	-2.3551^{***}	-2.3753^{***}	-2.3341^{***}	-2.9951^{***}	-3.0734^{***}
	(0.757)	(0.747)	(0.722)	(0.857)	(0.817)	(0.990)
L.Q2			0.0402	0.0407	0.0381	0.0385
			(0.034)	(0.034)	(0.034)	(0.034)
L.Q3			−0.0325	−0.0318	−0.0340	−0.0332
			(0.026)	(0.026)	(0.026)	(0.026)
L.Q4			-0.0542^{**}	-0.0532^{**}	-0.0619^{**}	-0.0609^{**}
			(0.025)	(0.025)	(0.026)	(0.026)
L.Q5			-0.0506^{*}	-0.0490^{*}	-0.0519^{*}	-0.0481^{*}
			(0.026)	(0.026)	(0.027)	(0.027)
Year FE	No	No	No	Yes	No	Yes
N	437	437	437	437	421	421
R-sq	0.069	0.081	0.099	0.102	0.117	0.121

Table 5.9: Distribution of Failed and EA in the Full Sample. Size is measured as total assets at the end of year 2006. Panel A displays bins of 10 firms each, being firms in bin 1 the smallest ones and bin 13 the largest in the sample.

		Panel A		Panel B	
Bin	Firms	Failed	Failed %	EA	EA %
1	10	0	0%	2	20%
2	10	1	10%	0	0%
3	10	0	0%	4	40%
4	10	3	30%	3	30%
5	10	0	0%	2	20%
6	10	3	30%	2	20%
7	10	1	10%	0	0%
8	10	2	20%	3	30%
9	10	2	20%	0	0%
10	10	1	10%	0	0%
11	10	0	0%	0	0%
12	10	4	40%	0	0%
13	9	3	33%	0	0%
Total	129	20	16%	16	12%

Table 5.10: Firm Size and Failure: Regression Results. F_{it} is a dummy variable equal to 1 if the firm i has been closed by means regulators intervention, and zero otherwise. Size is the firm's total assets measured in trillion dollars. logSize is the natural logarithm of total assets. Leverage is the book-value ratio of debt to assets. ROA is the ratio of operating income before depreciation scaled by total assets lagged one year. Q2, Q3, Q4, Q5 are dummy variables for quintiles of size 2, 3, 4, and 5 respectively by year. EAP is a dummy equal to 1 is the firm has received an enforcement action in the years previous to the year it is closed, and EAPC is a dummy equal to 1 if the firm has received an enforcement action either the years previous or the current year the firm is closed. All independent variables are lagged one period. All standard errors are clustered at the firm level. *, ** and *** represent significance levels at 10%, 5% and 1% respectively. Robust standard errors in parentheses.

	(1)	(2)	(3)	(4)	(5)	(6)
L.Size	−0.0207					
	(0.030)					
L.logSize		0.0024				
		(0.007)				
L.Leverage	0.4189***	0.3797***	0.3751***	0.3178**	0.2951**	0.2695**
	(0.129)	(0.130)	(0.126)	(0.125)	(0.124)	(0.110)
L.ROA	−2.5000**	−2.5538**	−2.6118**	−3.3942***	−3.0353**	−1.5868
	(1.040)	(1.039)	(1.066)	(1.259)	(1.286)	(1.194)
L.Q2			0.0196	0.0176	0.0119	−0.0113
			(0.022)	(0.022)	(0.022)	(0.018)
L.Q3			0.0129	0.0147	0.0163	0.0098
			(0.024)	(0.023)	(0.023)	(0.020)
L.Q4			−0.0149	−0.0133	−0.0100	−0.0018
			(0.030)	(0.029)	(0.029)	(0.028)
L.Q5			0.0273	0.0435	0.0444	0.0366
			(0.029)	(0.030)	(0.030)	(0.028)
EAP					0.7254***	
					(0.091)	
EAPC						0.8730***
						(0.064)
Year FE	No	No	No	Yes	Yes	Yes
N	437	437	437	437	437	437
R-sq	0.099	0.098	0.102	0.137	0.163	0.307

Table 5.11: Distribution of EA and Failure by Size for the Subsample of Commercial Banks. The table reports the number and percentage of firms with SIC codes 6020, 6035, or 6036 that have received and enforcement action or failed during the crisis period (2007- 2010) by size. Size is measured as total assets at the end of year 2006. Bin 1 contains the smallest firms and bin 11 the largest in the sample.

		Panel A		Panel B	
Bin	Firms	Failed	Failed %	EA	EA %
1	11	0	0%	2	18%
2	10	1	10%	1	10%
3	11	1	9%	5	45%
4	10	2	20%	2	20%
5	10	1	10%	2	20%
6	11	2	18%	1	9%
7	10	2	20%	0	0%
8	10	2	20%	3	30%
9	11	1	9%	0	0%
10	10	0	0%	0	0%
11	10	3	30%	0	0%
Total	114	15	13%	16	14%

Table 5.12: Firm Size, Enforcement Actions and Failure: Regression Results for the Subsample of Commercial Banks. Linear regression for enforcement actions (Panel A) and failure (Panel B) for the subsample of firms in SIC codes 6020, 6035 and 6036. EA_{it} is a dummy variable equal to 1 if the firm i has received an enforcement action in year t and zero otherwise. $EA_{it}N$ is a dummy variable equal to 1 if the firm i has received an enforcement action in year t, missing if the firm has failed in year t but has not received and enforcement action that year, and zero otherwise. Size is the firm's total assets measured in trillion dollars. F_{it} is a dummy variable equal to 1 if the firm i has been closed by means regulators intervention in year t, and zero otherwise. Size is the firm's total assets measured in trillion dollars. Leverage is the book-value ratio of debt to assets. ROA is the ratio of operating income before depreciation scaled by total assets lagged one year. NPA is the ratio of non-performing assets to total assets and Tier 1 is the Tier 1 capital ratio. Q2, Q3, Q4, Q5 are dummy variables for quintiles of size 2, 3, 4, and 5 respectively by year. EAP is a dummy equal to 1 is the firm has received an enforcement action in the years previous to the year it is closed, and EAPC is a dummy equal to 1 if the firm has received an enforcement action either the years previous or the current year the firm is closed. All independent variables are lagged one period. All standard errors are clustered at the firm level. *, ** and *** represent significance levels at 10%, 5% and 1% respectively. Robust standard errors in parentheses.

	Panel A				Panel B			
	(1) EA_{it}	(2) EA_{it}	(3) $EA_{it}N$	(4) $EA_{it}N$	(1) F_{it}	(2) F_{it}	(3) F_{it}	(4) F_{it}
L.Leverage	0.2714**	0.2416*	0.2744**	0.2387*	0.1739	0.0938	0.0891	0.0588
	(0.130)	(0.129)	(0.135)	(0.132)	(0.132)	(0.129)	(0.130)	(0.109)
L.ROA	0.2019	0.1263	−0.1281	−0.4401	−1.1006	−2.1972	−1.4914	−1.3176
	(1.128)	(1.201)	(1.236)	(1.357)	(1.695)	(1.709)	(1.695)	(1.456)
L.NPA	2.6983**	2.7598**	3.2891***	3.3663***	2.0236**	2.2223***	2.5136***	1.0213
	(1.159)	(1.156)	(0.948)	(0.962)	(0.923)	(0.793)	(0.767)	(0.895)
L.Tier1	0.0001	0.0009	−0.0018	−0.0002	−0.0072**	−0.0018	−0.0003	−0.0017
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.002)
L.Q2	0.0517	0.0531	0.0403	0.0415	0.0216	0.0223	0.0165	−0.0066
	(0.037)	(0.037)	(0.035)	(0.035)	(0.023)	(0.022)	(0.021)	(0.018)
L.Q3	−0.0026	−0.0012	−0.0103	−0.0090	0.0177	0.0203	0.0237	0.0110
	(0.030)	(0.030)	(0.029)	(0.028)	(0.024)	(0.022)	(0.022)	(0.018)
L.Q4	−0.0473	−0.0434	−0.0612**	−0.0567**	−0.0011	0.0089	0.0146	0.0158
	(0.029)	(0.028)	(0.027)	(0.027)	(0.030)	(0.029)	(0.029)	(0.027)
L.Q5	−0.0469*	−0.0427*	−0.0554**	−0.0487*	0.0127	0.0306	0.0340	0.0261
	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.026)	(0.025)	(0.023)
EAP							0.7835***	
							(0.107)	
EAPC								0.8115***
								(0.087)
Year FE	No	Yes	No	Yes	No	Yes	Yes	Yes
N	387	387	376	376	387	387	387	387
R-sq	0.161	0.166	0.201	0.207	0.164	0.196	0.236	0.372

Table 5.13: Firm Size, Enforcement Actions and Failure: Size Quartiles. EA_{it} is a dummy variable equal to 1 if the firm i has received an enforcement action in year t and zero otherwise. F_{it} is a dummy variable equal to 1 if the firm i has been closed by means regulators intervention in year t, and zero otherwise. Size is the firm's total assets measured in trillion dollars. Leverage is the book-value ratio of debt to assets. ROA is the ratio of operating income before depreciation scaled by total assets lagged one year. NPA is the ratio of non-performing assets to total assets and Tier 1 is the Tier 1 capital ratio. Q2, Q3, Q4, are dummy variables for quartiles of size 2, 3 and 4, respectively by year. EAP is a dummy equal to 1 is the firm has received an enforcement action in the years previous to the year it is closed, and EAPC is a dummy equal to 1 if the firm has received an enforcement action either the years previous or the current year the firm is closed. All independent variables are lagged one period. Banks are firms with sic 6020, 6035 and 6036. All standard errors are clustered at the firm level. *, ** and *** represent significance levels at 10%, 5% and 1% respectively. Robust standard errors in parentheses.

Table 9A - Quartiles per year

	All sample				Banks			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	EA_{it}	EA_{it}	F_{it}	F_{it}	EA_{it}	EA_{it}	F_{it}	F_{it}
L.Leverage	0.1540**	0.1438**	0.3860***	0.3351***	0.2790**	0.2497*	0.1645	0.0859
	(0.067)	(0.065)	(0.127)	(0.125)	(0.130)	(0.128)	(0.135)	(0.132)
L.ROA	−2.4188***	−2.3960***	−2.5407**	−3.2573**	0.3245	0.2318	−1.0695	−2.1760
	(0.755)	(0.887)	(1.063)	(1.245)	(1.102)	(1.190)	(1.647)	(1.637)
L.NPA					2.8169**	2.8775**	2.0479**	2.2399***
					(1.143)	(1.141)	(0.907)	(0.778)
L.Tier1					0.0001	0.0009	−0.0072**	−0.0018
					(0.003)	(0.003)	(0.004)	(0.003)
L.Q2	−0.0001	0.0001	0.0090	0.0086	0.0257	0.0264	0.0213	0.0212
	(0.030)	(0.030)	(0.023)	(0.023)	(0.034)	(0.034)	(0.022)	(0.021)
L.Q3	−0.0427*	−0.0419	0.0046	0.0078	−0.0287	−0.0266	0.0093	0.0159
	(0.025)	(0.025)	(0.029)	(0.029)	(0.028)	(0.027)	(0.025)	(0.024)
L.Q4	−0.0564**	−0.0551**	0.0104	0.0222	−0.0576**	−0.0533**	0.0129	0.0291
	(0.022)	(0.023)	(0.024)	(0.025)	(0.025)	(0.025)	(0.028)	(0.029)
Year FE	No	Yes	No	Yes	No	Yes	No	Yes
N	437	437	437	437	387	387	387	387
R-sq	0.081	0.085	0.098	0.131	0.151	0.157	0.163	0.196

Table 5.14: Firm Size, Enforcement Actions and Failure: Regressors Lagged Two Periods. Linear regression for enforcement actions and failure . EA_{it} is a dummy variable equal to 1 if the firm i has received an enforcement action in year t and zero otherwise. F_{it} is a dummy variable equal to 1 if the firm i has been closed by means regulators intervention, and zero otherwise. Size is the firm's total assets measured in trillion dollars. Leverage is the book-value ratio of debt to assets. ROA is the ratio of operating income before depreciation scaled by total assets lagged one year. NPA is the ratio of non-performing assets to total assets and Tier 1 is the Tier 1 capital ratio. Q2, Q3, Q4, Q5 are dummy variables for quintiles of size 2, 3, 4 and 5 respectively by year. EAP is a dummy equal to 1 is the firm has received an enforcement action in the years previous to the year it is closed, and EAPC is a dummy equal to 1 if the firm has received an enforcement action either the years previous or the current year the firm is closed. All independent variables are lagged one period. Banks are firms with sic 6020, 6035 and 6036. All standard errors are clustered at the firm level. *, ** and *** represent significance levels at 10%, 5% and 1% respectively. Robust standard errors in parentheses.

	All sample		Banks	
	(1)	(2)	(1)	(2)
	EA_{it}	F_{it}	EA_{it}	F_{it}
L2.Leverage	0.2200	0.2965*	0.1664	0.2907
	(0.135)	(0.168)	(0.135)	(0.177)
L2.ROA	0.7903	0.5414	0.6389	0.6730
	(1.033)	(1.594)	(1.048)	(1.590)
L2.NPA	3.8427*	5.3268**	3.7514*	5.2106**
	(2.224)	(2.483)	(2.222)	(2.513)
L2.Tier1	−0.0028	0.0023	−0.0026	0.0021
	(0.004)	(0.004)	(0.004)	(0.004)
L2.Q2	0.0551	0.0362	0.0585*	0.0247
	(0.037)	(0.025)	(0.035)	(0.024)
L2.Q3	−0.0280	0.0308	−0.0128	0.0257
	(0.025)	(0.024)	(0.030)	(0.022)
L2.Q4	−0.0572*	−0.0114	−0.0156	0.0184
	(0.030)	(0.035)	(0.033)	(0.042)
L2.Q5	−0.0589**	0.0373	−0.0517*	0.0119
	(0.027)	(0.037)	(0.027)	(0.031)
Year FE	Yes	Yes	Yes	Yes
Observations	380	380	380	380
R^2	0.091	0.096	0.082	0.088

6

Bibliography

Adams, R., B. E. Hermalin, and M. S. Weisbach (2008). The role of boards of directors in corporate governance: A conceptual framework and survey. *NBER - Working Paper 14486*.

Adams, R. B., H. Almeida, and D. Ferreira (2005). Powerful ceos and their impact on corporate performance. *Review of Financial Studies 18*(4), 1403–1432.

Anderson, J. D. and J. E. Core (2013). Managerial incentives to increase firm volatility provided by debt, stock, and options. *Working Paper, MIT*.

Azoulay, P., J. Graff Zivin, and J. Wang (2010). Superstar extinction. *Quarterly Journal of Economics 25*, 549–589.

Bebchuk, L., A. Cohen, and A. Ferrell (2009). What matters in corporate governance? *Review of Financial Studies 22*(2), 783–827.

Bebchuk, L., A. Cohen, and H. Spamann (2010). The wages of failure: Executive compensation at bear stearns and lehman 2000-2008. *Yale Journal on Regulation 27*(1), 257–282.

Bebchuk, L. and H. Spamann (2010). Regulating bankers pay. *Georgetown Law Journal 98*(2), 247–287.

Bebchuk, L. A. and J. M. Fried (2004). *Pay without performance*. Harvard University Press Cambridge, MA.

Bebchuk, L. A. and J. M. Fried (2006). *Pay without performance: The unfulfilled promise of executive compensation*. Harvard University Press.

Berger, A. and S. Davies (1998). The information content of bank examinations. *Journal of Financial Services Research 14*(2), 117–144.

Berger, A., S. Davies, and M. Flannery (2000). Comparing market and supervisory assessments of bank performance: who knows what when? *Journal of Money, Credit and Banking*, 641–667.

Bhagat, S. and B. Black (2001). The non-correlation between board independence and long-term firm performance. *Journal of Corporation Law 27*, 231.

Bhagat, S. and B. Bolton (2008). Corporate governance and firm performance. *Journal of Corporate Finance 14*(3), 257–273.

Bharath, S. and T. Shumway (2008). Forecasting default with the Merton distance to default model. *Review of Financial Studies 21*(3), 1339–1369.

Black, F. and M. Scholes (1973). The pricing of options and corporate liabilities. *The Journal of Political Economy*, 637–654.

Breeden, D. and S. Viswanathan (1998). Why do firms hedge? an asymmetric information model. *Fuqua School of Business, Working Paper*.

Brown, W. J. (2009). Formal enforcement actions issued against institutions. What do today's numbers say? *SRC-Insights 14*, 1.

Brunmeier, J. and N. Willardson (2006). Supervisory Enforcement Actions Since FIRREA and FDICIA. Arbitrary, Draconian and Inflexible, or a Model of Regulatory Restraint? *Working Paper Federal Reserve Bank of Minneapolis*.

Campbell, J., J. Hilscher, and J. Szilagyi (2011). Predicting financial distress and the performance of distressed stocks. *Journal of Investment Management 9*(2).

Carpenter, J. N. (2000). Does option compensation increase managerial risk appetite? *The Journal of Finance 55*(5), 2311–2331.

Cheng, H., H. Hong, and J. Scheinkman (2013). Yesterday's heroes: Compensation and creative risk-taking. *Working Paper*.

Chesney, M., J. Stromberg, and A. Wagner (2012). Risk-taking incentives, governance, and losses in the financial crisis. *Swiss Finance Institute Research Paper No. 10-18*.

Cohen, L., A. Frazzini, and C. J. Malloy (2012). Hiring cheerleaders: Board appointments of "independent" directors. *Management Science 58*(6), 1039–1058.

Cole, R. A. and J. W. Gunther (1998). Predicting bank failures: A comparison of on-and off-site monitoring systems. *Journal of Financial Services Research 13*(2), 103–117.

Coles, J., N. Daniel, and L. Naveen (2006). Managerial incentives and risk-taking. *Journal of Financial Economics 79*(2), 431–468.

Core, J. and W. Guay (2002). Estimating the value of employee stock option portfolios and their sensitivities to price and volatility. *Journal of Accounting Research 40*(3), 613–630.

Core, J. E., R. W. Holthausen, and D. F. Larcker (1999). Corporate governance, chief executive officer compensation, and firm performance. *Journal of Financial Economics 51*(3), 371–406.

Curry, T., P. Elmer, and G. Fissel (2003). Using market information to help identify distressed institutions: a regulatory perspective. *FDIC Banking Review 15*(3), 1–16.

Curry, T., J. O'Keefe, J. Coburn, and L. Montgomery (1999). Financially distressed banks: How effective are enforcement actions in the supervision process? *FDIC Banking Review 12*, 1–18.

Dechow, P. M., R. G. Sloan, and A. P. Sweeney (1995). Detecting earnings management. *Accounting Review*, 193–225.

DeMarzo, P. M. and D. Duffie (1995). Corporate incentives for hedging and hedge accounting. *Review of Financial Studies 8*(3), 743–771.

DeYoung, R., E. Y. Peng, and M. Yan (2013). Executive compensation and business policy choices at US commercial banks. *Journal of Financial and Quantitative Analysis 48*(01), 165–196.

Dybvig, P. H. and M. Warachka (2012). Tobins q does not measure firm performance: Theory, empirics, and alternative measures. *SSRN eLibrary. http://papers. ssrn. com/sol3/papers. cfm.*

Edmans, A. and Q. Liu (2011). Inside debt. *Review of Finance 15*(1), 75–102.

Erkens, D. H., M. Hung, and P. Matos (2012). Corporate governance in the 2007–2008 financial crisis: Evidence from financial institutions worldwide. *Journal of Corporate Finance 18*(2), 389–411.

Espen Eckbo, B. and K. S. Thorburn (2003). Control benefits and ceo discipline in automatic bankruptcy auctions. *Journal of Financial Economics 69*(1), 227–258.

Fahlenbrach, R., R. Prilmeier, and R. M. Stulz (2012). This time is the same: Using bank performance in 1998 to explain bank performance during the recent financial crisis. *The Journal of Finance 67*(6), 2139–2185.

Fahlenbrach, R. and R. Stulz (2011). Bank CEO incentives and the credit crisis. *Journal of Financial Economics 99*(1), 11–26.

Fich, E., D. Garcia, T. Robinson, and A. Yore (2009). Corporate philanthropy, agency problems, and shareholder wealth.

Fracassi, C. and G. Tate (2012). External networking and internal firm governance. *The Journal of Finance 67*(1), 153–194.

Gande, A. and S. Kalpathy (2012). Ceo compensation and risk-taking at financial firms: Evidence from us federal loan assistance.

Gilbert, R. and M. Vaughan (2001). Do depositors care about enforcement actions? *Journal of Economics and Business 53*(2-3), 283–311.

Goldstein, I. and H. Sapra (2014). Should banks' stress test results be disclosed? An analysis of the costs and benefits. *Foundations and Trends in Finance 8*(1), 1–54.

Gompers, P., J. Ishii, and A. Metrick (2003). Corporate governance and equity prices. *The Quarterly Journal of Economics 118*(1), 107–156.

Hall, B. J. and K. J. Murphy (2002). Stock options for undiversified executives. *Journal of accounting and economics 33*(1), 3–42.

Hermalin, B. E. and M. S. Weisbach (1991). The effects of board composition and direct incentives on firm performance. *Financial Management*, 101–112.

Hermalin, B. E. and M. S. Weisbach (1998). Endogenously chosen boards of directors and their monitoring of the ceo. *American Economic Review*, 96–118.

Houston, J. and C. James (1995). CEO compensation and bank risk Is compensation in banking structured to promote risk taking? *Journal of Monetary Economics 36*(2), 405–431.

Hwang, B.-H. and S. Kim (2009). It pays to have friends. *Journal of Financial Economics 93*(1), 138–158.

Ingersoll, J. E. (2006). The subjective and objective evaluation of incentive stock options*. *The Journal of Business 79*(2), 453–487.

Jensen, M. and W. Meckling (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial economics 3*(4), 305–360.

John, K., H. Mehran, and Y. Qian (2010). Outside monitoring and CEO compensation in the banking industry. *Journal of Corporate Finance 16*(4), 383–399.

John, K. and Y. Qian (2003). Incentive features in ceo compensation in the banking industry. *Economic Policy Review 9*(1).

John, T. A. and K. John (1993). Top-management compensation and capital structure. *The Journal of Finance 48*(3), 949–974.

Jordan, J., J. Peek, and E. Rosengren (1999). *The impact of greater bank disclosure amidst a banking crisis.* Federal Reserve Bank of Boston.

Jordan, J., J. Peek, and E. Rosengren (2000). The market reaction to the disclosure of supervisory actions: Implications for bank transparency. *Journal of Financial Intermediation 9*(3), 298–319.

Kane, E. J. (2000). Incentives for banking megamergers: what motives might regulators infer from event-study evidence? *Journal of Money, Credit and Banking*, 671–701.

Koudijs, P. and H.-J. Voth (2014). Leverage and beliefs: Personal experience and risk taking in margin lending. *NBER Working Paper no. 19957*.

Laeven, L. and R. Levine (2009). Bank governance, regulation and risk taking. *Journal of Financial Economics 93*(2), 259–275.

Lambert, R. A., D. F. Larcker, and R. E. Verrecchia (1991). Portfolio considerations in valuing executive compensation. *Journal of Accounting Research*, 129–149.

Malmendier, U. and S. Nagel (2011). Depression babies: Do macroeconomic experiences affect risk taking? *The Quarterly Journal of Economics 126*(1), 373–416.

Masulis, R. W. and S. W. Reza (2013). Agency problems of corporate philanthropy. Technical report, Working Paper, University of New South Wales.

Merton, R. C. (1973). Theory of rational option pricing. *Bell Journal of Economics 4*(1), 141–183.

Morck, R., A. Shleifer, and R. W. Vishny (1990). Do managerial objectives drive bad acquisitions? *The Journal of Finance 45*(1), 31–48.

Morgan, D. P. and K. J. Stiroh (2005). Too big to fail after all these years. Technical report, Staff Report, Federal Reserve Bank of New York.

O'hara, M. and W. Shaw (1990). Deposit insurance and wealth effects: the value of being "too big to fail". *The Journal of Finance 45*(5), 1587–1600.

Peek, J. and E. Rosengren (1997). Will legislated early intervention prevent the next banking crisis? *Southern Economic Journal 64*(1), 268–280.

Penas, M. F. and H. Unal (2004). Gains in bank mergers: Evidence from the bond markets. *Journal of Financial Economics 74*(1), 149–179.

Prendergast, C. (2002). The tenuous trade-off between risk and incentives. *The Journal of Political Economy 110*(5), 1071–1102.

Prescott, E. S. (2008). Should bank supervisors disclose information about their banks? *Economic Quarterly-Federal Reserve Bank of Richmond 94*(1), 1.

Rime, B. (2005). Do too-big-to-fail expectations boost large banks issuer ratings. *Swiss National Banks, Systemic Stability Section: Working Paper (May 9)*.

Shapira, R. (2012). Corporate philanthropy as signaling and co-optation. *Fordham Law Review 80*(5).

Shapiro, J. Speech by SEC Chairman: Address to Transatlantic Corporate Governance Dialogue 2009 Conference. U.S. SEC. Washington D.C.

Slovin, M., M. Sushka, and J. Polonchek (1999). An analysis of contagion and competitive effects at commercial banks. *Journal of Financial Economics 54*(2), 197–225.

Story, L. and J. Becker (2009, June 12). Bank chief tells of U.S. pressure to buy Merrill Lynch. *The New York Times*.

Sundaram, R. and D. Yermack (2007). Pay me later: Inside debt and its role in managerial compensation. *The Journal of Finance 62*(4), 1551–1588.

Wintoki, M. B., J. S. Linck, and J. M. Netter (2012). Endogeneity and the dynamics of internal corporate governance. *Journal of Financial Economics 105*(3), 581–606.

Yermack, D. (2006). Golden handshakes: Separation pay for retired and dismissed CEOs. *Journal of Accounting and Economics 41*(3), 237–256.